REVIEW AND APPROVALS

SHIAWASSEE NATIONAL WILDLIFE REFUGE

Saginaw, Michigan

ANNUAL NARRATIVE REPORT

Calendar Year 1988

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Refuge Manager

4/6/89
Date

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Refuge Supervisor Review

4/21/89
Date

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4/24/89
Date

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INTRODUCTION

Shiawassee National Wildlife Refuge was established in 1953, based on recommendations of the Migratory Bird Conservation Commission, to restore and enhance a historically important wetland area for the benefit of migrating waterfowl. Its formation resulted from the culmination of numerous land use proposals, and attempts over many years by various private conservation groups and governmental agencies. As a result of local and regional conservationist's initiatives toward reclamation (from marginal agriculture to natural habitats), the State of Michigan established the Shiawassee River State Game Area adjacent to the Federal refuge project. Together, these two areas encompass and practice complementary management on approximately 20,000 acres of some of the most valuable waterfowl habitat in the state. The refuge is 8,984 acres in size and is located in central Michigan about twenty-five miles south of Saginaw Bay.

The refuge is part of an area historically known as the "Shiawassee Flats", an extensive floodplain once rich in shallow water, marsh, and riparian vegetation with associated wildlife resources. Following a period of extensive timber harvest and coal mining in the area, agricultural development through ditching and draining began in the early 1900's. Five rivers converge at various points on the refuge that make the area prone to flooding, especially in the spring. This overflow bottomland/marsh habitat attracts concentrations of migrating waterfowl for which the area has become well known. With restoration of these wetland habitats and protection from human disruption, peak populations of 35,000 geese, 40,000 ducks, and 2,500 swan, high concentrations of wading and waterbirds, migrant and nesting bald eagles, and other wetland species are now common.

Wyandotte NWR, administered as a satellite of Shiawassee, was established by an Act of Congress in 1961 to "be maintained .....for migratory birds and other wildlife". It consists of two islands, Grassy and Mammajuda, and adjacent shallow water area approximately to the six-foot contour depth, totaling 304 acres, in the Detroit River just off shore from the cities of Wyandotte and Ecorse. From 1948 to 1961 the islands were controlled by the U.S. Coast Guard.

The Michigan Islands NWR, administered as a satellite of Shiawassee, was established by Executive Order in 1943 as a refuge and breeding ground for migratory birds and other wildlife. These three islands, Shoe and Pismire in Lake Michigan and Scarecrow in Lake Huron, are 2, 3, and 7 acres respectively in size, and are similar in character. A fourth island, Thunder Bay, was added to the refuge in 1965 by a U.S. Coast Guard/Fish and Wildlife Service agreement under a revocable permit (five-year renewal periods). The Service has secondary jurisdiction on 121 acres of the total 168 acres on Thunder Bay Island. Gull Island (230 acres) became the fifth island in the system in 1969 when it was ceded to the Service by the U.S. Coast Guard. The three original islands in the Michigan Islands NWR were designated as Wilderness Areas in 1970 under Public Law 91-504, Stat. 1104.

A. HIGHLIGHTS

- Replacements for the Refuge Manager and Primary Assistant Manager entered on duty during the first two months of the year (Section E.1)

- Shiawassee had an accident free year (Section E.6)

- Coordination meeting held between the State and the Refuge (Section F.1)

- Farm Bill activities were a major effort this year (Section F.2)

- Spraying efforts were increased to control purple loosestrife (Section F.10)

- Dike work for Moist Soils 3 and 4 completed (Section I.1)

B. CLIMATIC CONDITIONS

Statistically, 1988 was a typical year for total precipitation. However, the distribution of precipitation had a major influence on activities (Figure B1). May and June were dry. This, in combination with above average temperatures during spring and summer months (Figure B2) and below average snowfall last winter, left much of the refuge dry. The summer drought had some positive effects. Pool 1A dried out thoroughly resulting in a significant carp kill and allowed access for needed rejuvenation. Despite average rainfall in August and September, most wetlands remained dry. However, during October and November above average rainfall helped fill most wetland areas for waterfowl use. All weather data was received from Saginaw Waterworks which is located approximately 1 mile from the refuge.

C. LAND ACQUISITION

3. Other

Realty Specialist Dick Johnson proposed a land exchange between the U.S. Fish and Wildlife Service and the Michigan Department of Natural Resources for a 49 acre tract of land within the boundary. The proposal was to exchange the 49 acres for an equal value amount of land area next to State land. As of the end of the year, both the Michigan Department of Natural Resources and the Fish and Wildlife Service agreed to the exchange. The only item needed is the preparation of an Environmental Assessment by the State.

Refuge Manager Prusa and Assistant Manager Weide traveled to the Wyandotte Refuge area on March 25, to meet with Regional Office Realty staff Maureen Murphy and Dick Sorenson. Also present were Bob Pacific, East Lansing Ecological Services, and John Filkins, Environmental Protection Agency, Grosse Isle. The Agency has 40 acres that they were going to excess. Instead of placing the acreage on excess for sale they thought that another agency may want it. The staff from

FIGURE B1. 1988 COMPARED TO NORMAL TOTAL PRECIPITATION BY MONTH.

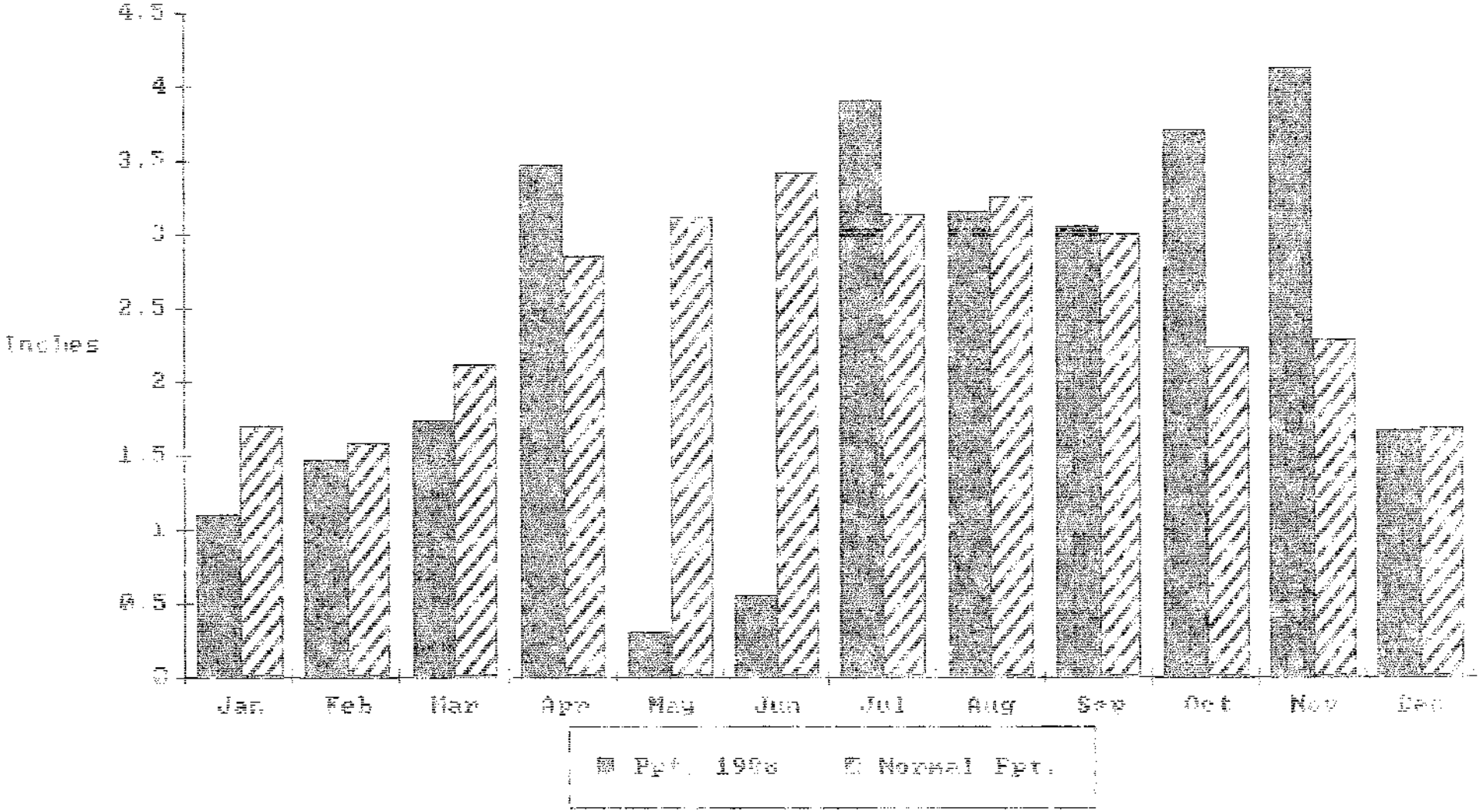
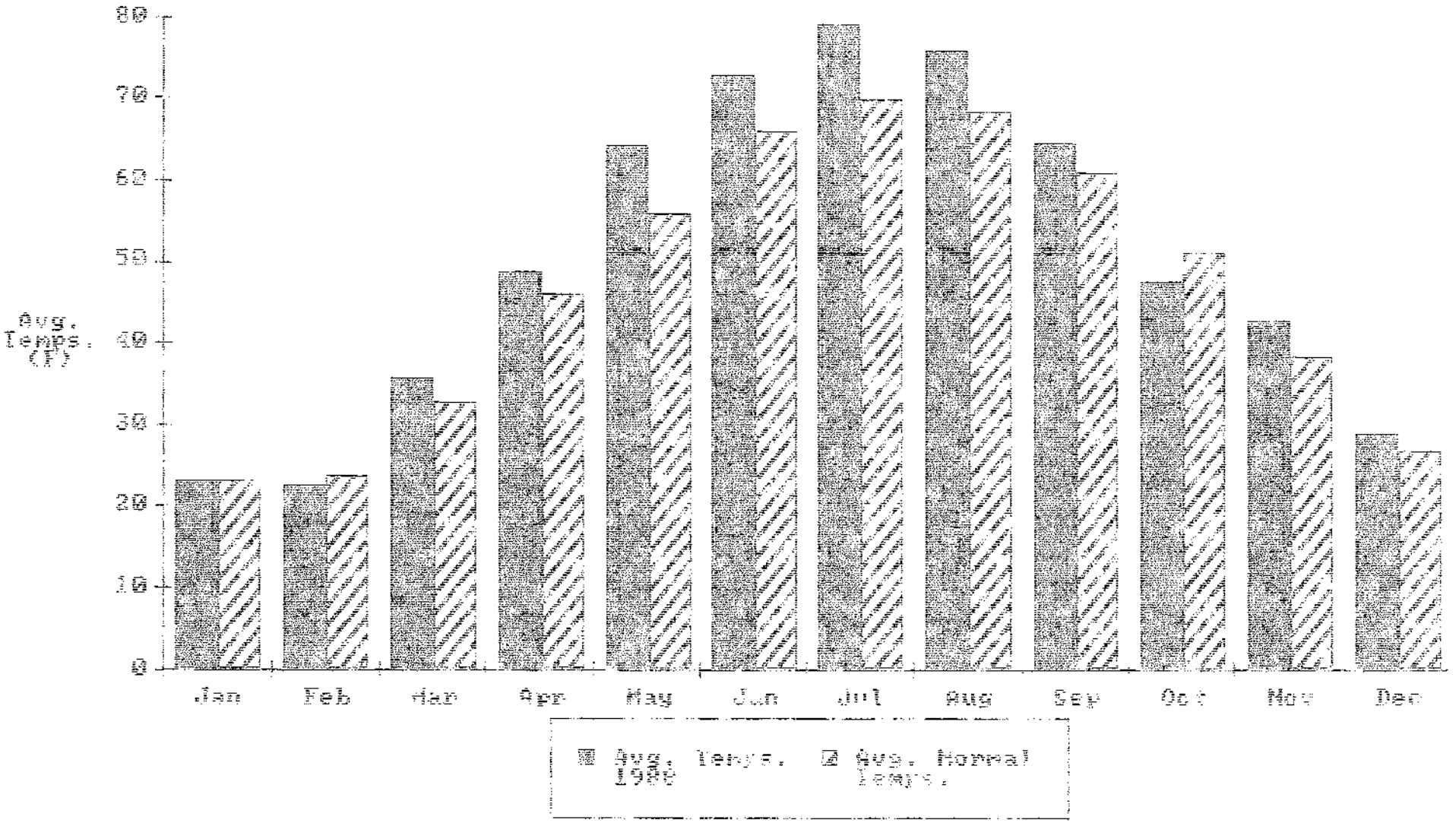


FIGURE B2. 1988 COMPARED TO NORMAL TEMPERATURES BY MONTH.



Realty set up the meeting to evaluate the site. After analyzing all the information it was determined that the site would not be suitable to include in the National Wildlife Refuge System. For the small amount of acreage and the distance from the headquarters the inclusion of this area was impractical.

D. PLANNING

2. Management Plan

The station Sign Plan revision was completed in March and approved by the Regional Office in early May. A revised Wildlife Inventory Plan was due in 1988. However, personnel turnover and farm bill related work forced postponement and a new deadline of June 1989 was set.

3. Public Participation

The staff worked closely with two special interest groups and had several meetings to determine the special regulations for the 1988 deer hunt. The two groups were the Shiawassee Flats Citizens and Hunters Association and the Bad River Bow Hunters. Both groups have been very vocal about the way the deer hunts were handled in the past. It was determined that it was much better to work with these groups as long as good, sound biological techniques were used in determining the type of hunt and the harvest goal. Early in 1988 an aerial survey was conducted in cooperation with the State Biologist from the Shiawassee River State Game Area, a member of the Shiawassee Flats Association, and one of our Assistant Managers. The object of the survey was to determine the post-season deer population on both the State and Federal Areas. From this information a harvest goal was determined through biological reasoning. At the coordination meetings the parameters for the 1988 deer hunt were set. They included the type of hunt and the harvest goals. The group also agreed to try and manage the herd on both areas at a post-season level of between 500-600 animals. With this cooperation and openness the relationship with these groups should become stronger and more trusting.

4. Compliance with Environmental and Cultural Resource Mandates

The Corps of Engineers, and Michigan Department of Natural Resources and Bureau of History were contacted regarding authorization for Pool 1A dike rehabilitation. However, because of design changes during the year, further coordination with these agencies will be required in 1989.

Construction associated with Moist Soil Units 3 and 4 was authorized by the Corps of Engineers and Department of Natural Resources, relating to Section 404, in January and February, respectively. Further authorization by the State Historic Preservation Officer was granted in August.

5. Research and Investigations

Shiawassee NWR 87 - A Survey of Xenobiotics on the Shiawassee National Wildlife Refuge by Greggory B. Herbert, The Ohio State University, Ohio Cooperative Wildlife Research Unit; No. 14-16-009-1539. The Thesis was completed in 1988 with the following conclusion:

> Overall the Shiawassee National Wildlife Refuge was relatively uncontaminated despite its susceptible location. Two contaminants of concern were cadmium and PCB's. Both of these contaminants were found in raccoon tissues at levels above those reported in the literature as background levels for wildlife. Studies should be conducted to determine the sources of these contaminants and their distributions within the food chain. This information will be useful in determining the possible susceptibilities of migratory waterfowl and non-migratory species by cadmium and PCB's. A biological diversity index should be used to monitor the water quality of the rivers. This information will be useful in determining if the aquatic systems are under any stress as a result of gross contamination.

The East Lansing Ecological Services Field Office was provided $47,000 for contaminant analysis on Wyandotte and Michigan Islands National Wildlife Refuges. Results of this analysis will be in about a year.

E. ADMINISTRATION

Group Photo : 8, 7, 1, 5, 2, 6, 3 (11/88; AL)

1. Personnel

1. Thomas F. Prusa, Refuge Manager, GS-12, PFT; entered on duty 2/14/88.

2. Edward S. Merritt, Refuge Manager, GS-11, PFT; entered on duty 1/17/88.

3. Richard A. Weide, Refuge Manager, GS-9, PFT

4. Diane L. Johnson, Refuge Manager, GS-5, PFT; transferred to Mingo NWR 1/3/88.

5. Shirley L. Wolfe, Administrative Technician, PFT

6. John P. Hart, Biological Aid, GS-4, Seasonal; entered on duty 5/15/88, terminated 12/23/88.

7. Lawrence J. Blazo, Maintenance Mechanic, WG-9, PFT

8. Marion L. Nowosatko, Maintenance Worker, WG-8, PFT

Personnel Levels Over the Past Five Years

Calendar Year	Permanent Full-time	Permanent Part-time	Temporary
1988	6	0	1
1987	7	0	0
1986	6	0	2
1985	7	0	0
1984	6	1	2

-- Primary Assistant Manager Edward Merritt entered on duty on January 17th. Ed came from Alamosa/Monte Vista National Wildlife Refuge.
-- Refuge Manager Thomas Prusa entered on duty on February 14th. Tom came from Attwater Prairie Chicken National Wildlife Refuge.
-- Refuge Manager Prusa and Assistants Merritt and Weide attended the annual Law Enforcement Refresher at Wisconsin State Patrol Academy in Fort McCoy from February 29th through March 4th.
-- Maintenance Worker Nowosatko was promoted from a WG-7 to a WG-8.
-- Assistant Manager Weide attended a Wildlife Disease Workshop in Madison, Wisconsin in March.
-- John Hart was selected in March as a temporary Biological Aid for a 6-month period. John is a Senior at University of Wisconsin-Stevens Point. John proved to be a valuable asset.
-- Maintenance Mechanic Blazo was hospitalized for congestive heart failure. He was on sick leave for a total of 5 weeks.
-- Refuge Manager Prusa presented Maintenance Worker Nowosatko with his 10-year pin and certificate.

-- Assistant Manager Weide participated in a 5-week banding assignment in Canada.
-- Refuge Manager Prusa presented the staff with the Award of Safety Accomplishment he received at the Project Leader's Meeting.
-- Assistant Manager Merritt received a Special Achievement Award for his involvement in farm bill activities.
-- Maintenance workers Blazo and Nowosatko received letters of appreciation and gifts, Farm Bill T-shirts, from the Regional Directorate for their participation in wetland restoration work.
-- Refuge Manager Prusa and Assistant Manager Merritt attended a non-game workshop in Minneapolis during August.

2. Youth Programs

In 1988, seasonal workers were selected from the Michigan Youth Corps (MYC). The Corps is attractive because older and more versatile workers, 18 to 21 years of age, are available at no cost to the Fish and Wildlife Service. Under this program the refuge serves only as a worksite. Two MYC enrollees, Ron Portwine and Mark Felton, were selected in June and worked approximately 8 weeks each. Their contribution included maintaining buildings and grounds around the headquarters area, clean up of visitor access points, and routine servicing and cleaning of vehicles. Overall guidance was provided by Assistant Manager Merritt.

3. Other Manpower Programs

Participation in the U.S. Department of Labor's Green Thumb program began in January of 1987 and continued through November of 1988. Based on the premise that older, low income persons have the right to remain actively employed, this program serves to develop part-time employment opportunities in community service. Alexander Lichtenwald enrolled in August of 1987 and worked through July 22, 1988. Alex resigned and was replaced by Perry Hamilton in August. Perry remained enrolled through October 7th. Both Alex and Perry worked twenty-one hours per week and were assigned to assist our maintenance staff with a variety of jobs including cleaning, painting, light maintenance, lawn mowing, and trimming.

Green Thumb Enrollee Alex Lichtenwald assisted in a variety of maintenance tasks throughout the year. (5/88; RW)

4. Volunteer Program

The year began with regular Volunteers David Peters and Bob Grefe assisting with an overdue update of the bird list. The coming of spring saw Volunteers David, Bob, and Bruce Winchell again eager to help with the songbird monitoring study (Section J.1). A new Volunteer, Ron Weeks, was welcomed to the staff in April. Ron's keen eye for shorebirds was an asset. Volunteers were used during summer months to keep farm bill related activities on schedule. David was especially helpful during surveys and seeding associated with wetland restorations. As winter approached, volunteer hours were greatly appreciated to help the station meet its 1988 Canada goose neckband observation quota.

Despite important contributions, the total of 614 volunteer hours was down 13% from 1987. Collection of morphological data from harvested Canada geese was scaled down this year (Section H.8.a), accounting for much of the reduced volunteer effort.

5. Funding

Funding for FY'88 was adequate especially when it is realized that two permanent change of stations were absorbed by the allocated funds. Total cost for the two station changes came to $44,396.00. The funding levels for the past 5 years are as follows:

Fiscal Year	Dollars
1988	389,900*
1987	273,500
1986	292,600
1985	359,200
1984	293,000

*Included in this allocation are the following funds:

ARMM-Pool 1A Rehab	$ 50,000
RP-purple loosestrife control	8,600
Contaminant Analysis (Wyandotte NWR)	20,000
Contaminant Analysis (Michigan Islands NWR)	27,000
Total.....	$105,600

6. Safety

Shiawassee was accident free in 1988. This accomplishment did not go unnoticed by the Regional Office as the Region 3 Award of Safety Accomplishment was presented to Shiawassee in August. Cash awards were later received by all station personnel.

Audiometric testing of maintenance personnel was initiated on May 4. The Spaulding Township Volunteer Fire Department was given a tour of facilities on May 19th and all agreed that familiarity with buildings and property can be important during an emergency. A boating safety slide program from the Regional Film Library was provided to the staff in June. First aid skills were refreshed in November when the American Red Cross presented their 8-hour standard first aid course to all employees.

First Aid
Training
"Butch to the rescue"
(11/88; RW)

7. Technical Assistance

Technical assistance was provided to requesting and cooperating agencies, groups, and individuals on an on-call basis.

Several meetings were held with the Flint River Dike Committee with regards to the issuance of a right-of-way permit to relocate an existing dike. It was not until the end of the year that the information they were to provide was completed.

The Refuge Manager served as a member of the Saginaw Country Mosquito Abatement Commission's Technical Advisory Committee.

8. Other

John Ellis, Jay Hamernick, Doug Johnson, and Bob Foster paid a visit in June to meet with the staff. Even though their visit was short, it was valuable giving us more insight on John's management philosophy. At the end of September John was relieved of his duties as our refuge supervisor.

Refuge Manager Prusa delivered revenue sharing checks to Spaulding Township for $22,645 and James Township for $6,014. A check was mailed to St. James Township for $463.

Refuge Manager Prusa contacted Congressman Schuette's District Office in Midland and tried to make an appointment his aid, Karen McKellar. Ms McKellar put off the meeting until a later date after the 1988 election.

A congressional inquiry was received in this office concerning the opening of an access road for boat launching. The same request came through Senator Reigle's office in February. This time Congressman Schuette wrote direct. After a call to the Regional Office and a conversation with Jay Hammernick, Refuge Manager Prusa answered the inquiry with basically the same letter sent previously to the Senator.

Dick Tolzmann and Len Schumann visited to look at three Conservation Reserve Program wetland sites that Assistant Manager Merritt located. After they returned they seemed to be enthused about the type of wetlands that can be created in this part of Michigan.

The staff met with State Waterfowl Biologist Jerry Martz and Wildlife Area Manager Bob Humphries. The meeting was a general one being the first time the new Manager and Assistant met with the waterfowl biologist. Discussions covered our management philosophy, our Cooperative Agreement, management of the area west of the Misteguay, the Master Plan for Shiawassee River State Game Area, and others. It was also discussed that it would be a good idea to set up a coordination meeting between the State, Seney NWR, Shiawassee NWR, and our Regional staff.

Refuge Manager Prusa, Assistants Merritt and Weide, and Biological Aid Hart attended a public meeting on the draft Master Plan for the Shiawassee River State Game Area. Lansing Department of Natural Resources Supervisor Dick Eldon made the presentation and then solicited for comments from the audience.

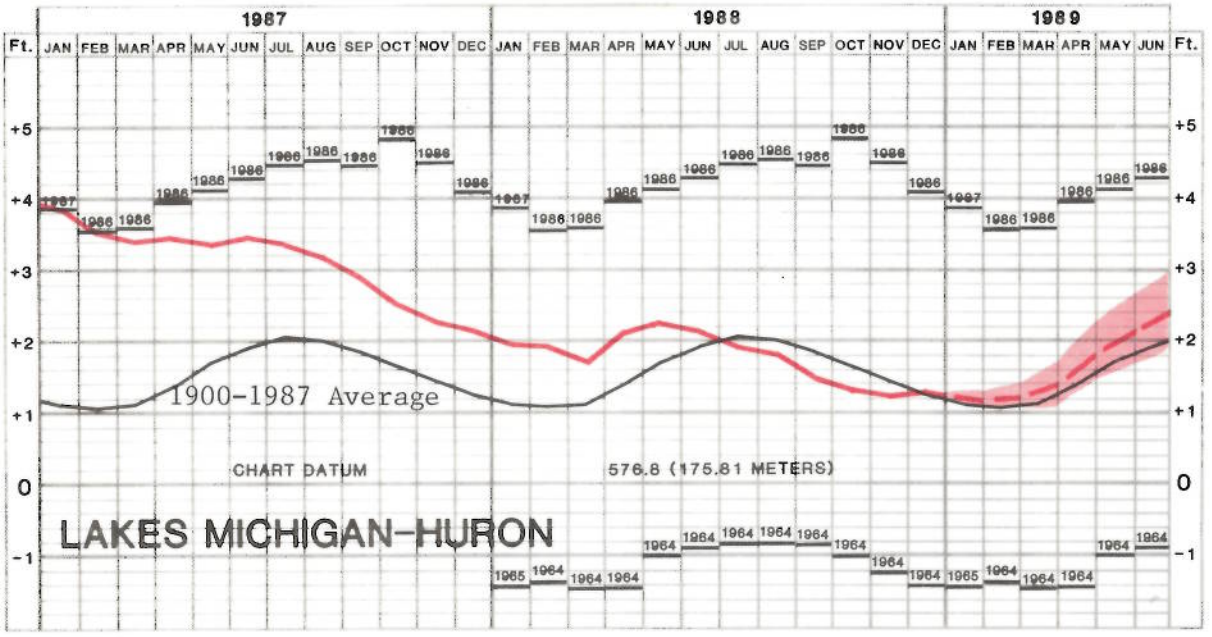
F. HABITAT MANAGEMENT

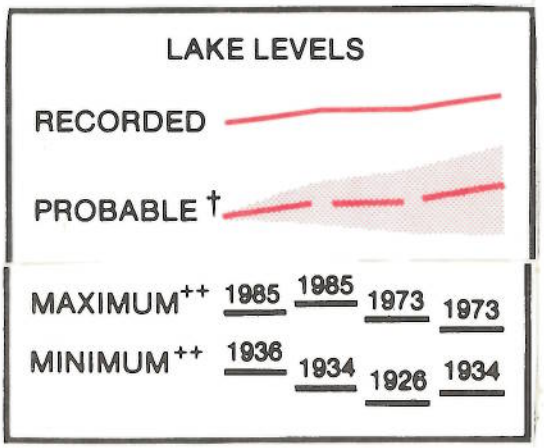
1. General

The levels of river systems that converge on the refuge generally dictate habitat management options. High water from Lake Huron, coupled with northeast winds, caused high water/flooding along area rivers during much of this decade. Flooding often hampered routine management activities and interfered with major construction. As precipitation declined and Lake Huron fell during 1987-88 (Figure F1) management capability returned. Maintenance of forest openings and other early succession habitats, for example, was facilitated by the drier conditions. Further access to many areas by an all-terrain vehicle for loosestrife control was made possible by low water and drought. A breakdown of the habitats is shown in Figure F2.

Drought facilitated maintenance of early succession habitats. (7/88; EM)

Figure F1 - Lakes Michigan-Huron Water Levels 1987-1989





2. Wetlands

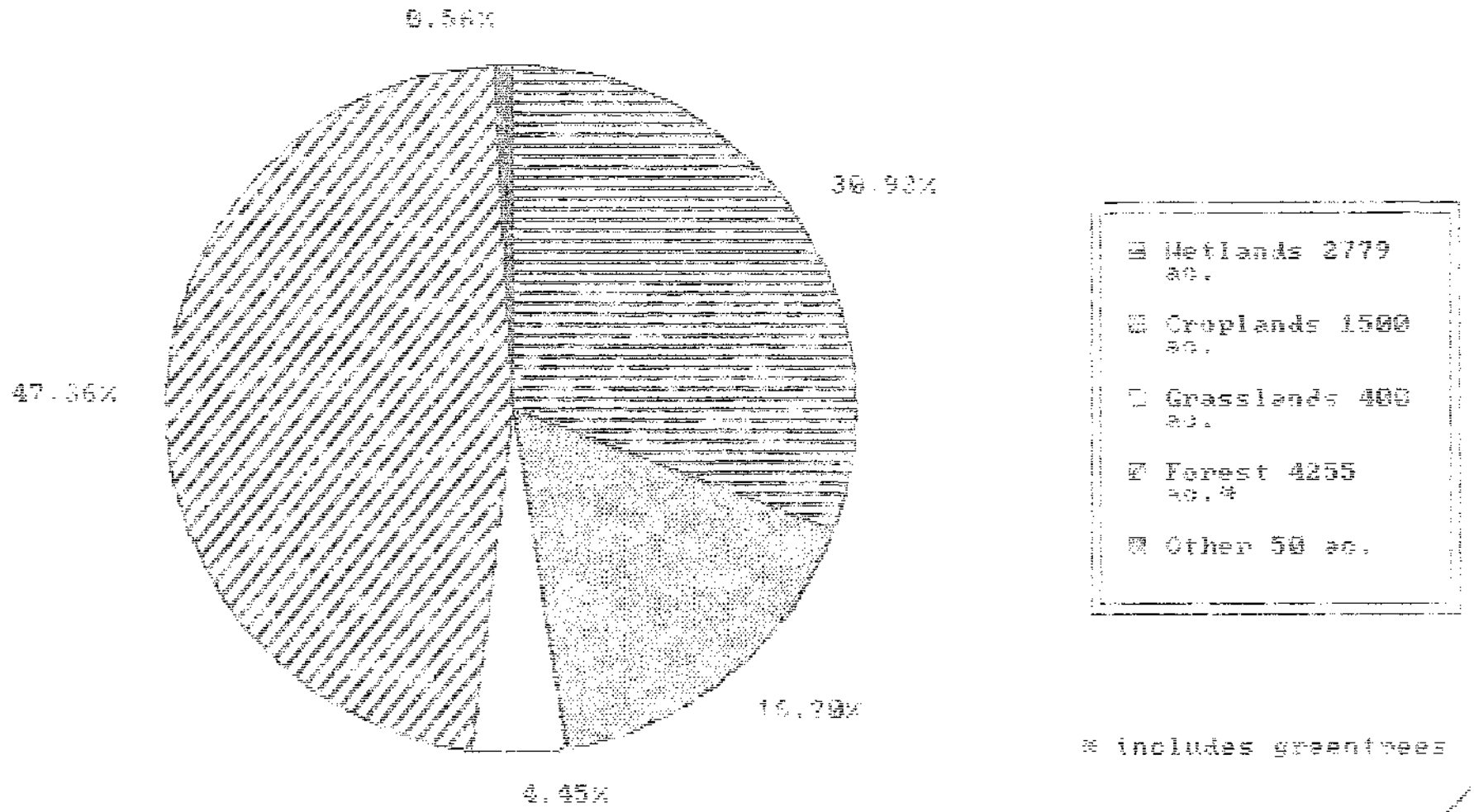
a. Refuge Wetlands

Figure F3 provides a breakdown of wetland types and indicates acreage and percent of total wetlands of each type.

(1) Moist Soil Unit 1

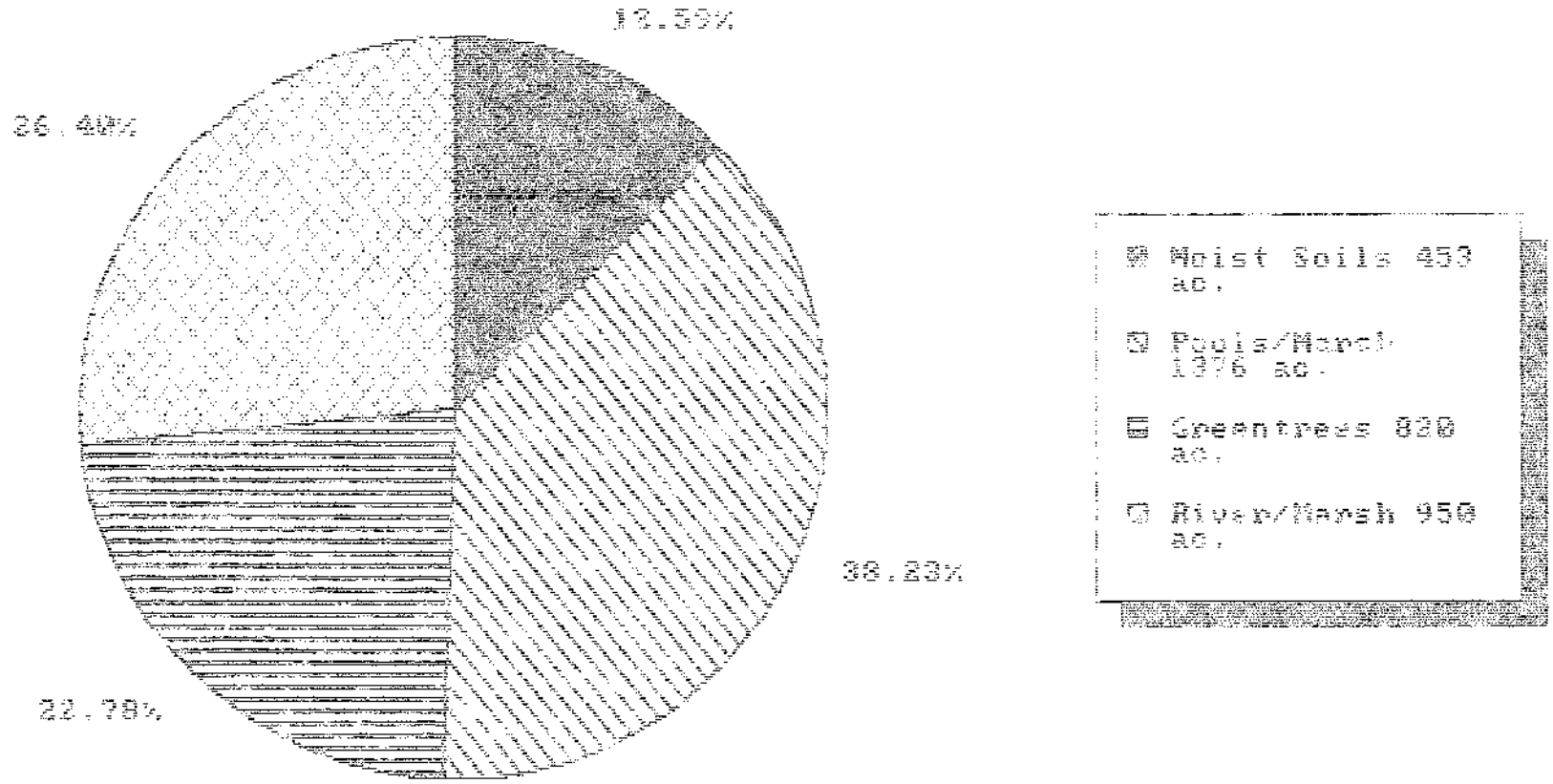
The unit was dewatered in May as planned. Hot, dry weather resulted in excessive drying of soils, however, and cocklebur invaded quickly. Water was added in early June to retard upland species. Moist soil plants, primarily millet, were encouraged and additional germination followed. The drought of 1988 forced frequent pumping to avoid excessive drying throughout the summer. Dense growths of millet were forming seedheads by late July. Water was increased gradually, beginning in late September, until an average depth of 6-8 inches was achieved by late October, corresponding to peak waterfowl numbers. Mallards and black ducks made considerable use of Moist Soil Unit 1 throughout the fall.

FIGURE #2. HABITATS OF SHIAWASSEE NATIONAL WILDLIFE REFUGE
(ACRES AND PERCENT OF TOTAL REFUGE)



* includes greentrees

FIGURE F3. WETLANDS OF SHIAWASSEE NATIONAL WILDLIFE REFUGE (ACRES AND PERCENT OF TOTAL WETLANDS)



Excellent millet response after drawdown in Moist Soil Unit 1. (6/88; EM)

Mature millet in Moist Soil Unit 1. (9/88; RW)

Mallards in Moist Soil Unit 2. (10/88; RW)

(2) Moist Soil Unit 2

Attempts were made to hold water in Moist Soil Unit 2 until mid-June. Despite frequent pumping with a Crisafulli, drought conditions resulted in excessive drying of the unit's south half and cocklebur and other undesirables became dominant. Drought stress may have favored purple loosestrife as the distribution and density seemed to increase in 1988. Lower elevations to the north retained water and a cattail/bulrush community developed. After dewatering, moist soil species were slow to respond. Unvegetated mudflats were seeded with Japanese millet on July 11th to supplement natural production. Low areas of the unit were flooded in early September and waterfowl response was good, particularly where millet was prevalent. However, high elevations in the south half were inadequately flooded and this area was of little value to wildlife.

Installation of water level gauge in Moist Soil Unit 2. (5/88; RW)

Cattails in Moist Soil Unit 2. (6/88; RW)

(3) Moist Soil Units 3 and 4

To facilitate construction of a new exterior dike, Moist Soil Units 3 and 4 were kept relatively dry throughout the summer. Construction was completed in September. Redesign reduced the area of these units to 163 acres leaving 155 acres in manageable marsh and 67 acres in miscellaneous wetland. Despite intense drought, scattered moist soil plants were common. However, anticipating initial moist soil management efforts in 1989, most of the units were disked during late summer. Construction status of the new pump station and control structures is discussed under Section I.1.

(4) Pool 1A

The planned drawdown of Pool 1A was often frustrated by fluctuating river levels. Much of the excess water was drained through Pool 1B or into the Shiawassee River as conditions permitted. Although planned for 1988, rehabilitation of perimeter dikes was rescheduled for 1989 due to errors in original cost estimates. My mid-summer, the drought and record temperatures removed all standing water from the unit and persistent rough fish were eliminated. In August, an estimated 75% of the unit was disked. Coupled with continued dry weather, significant decomposition of accumulated organic matter was probably achieved. Several low areas retained enough moisture to support production of moist soil foods such as nutsedge and smartweed. As water was added during the fall these areas became key feeding sites for waterfowl. An estimated 20-30,000 mallards were using Pool 1A by late October. Persistent low river levels hampered efforts to fill Pool 1A and unit levels were well below normal as 1988 drew to a close. The status of Pool 1A dike rehabilitation is discussed under Section I.1.

Concentrated carp during drawdown of Pool 1A.
(6/88; RW)

Pool 1A dewatered (7/88; RW)

Renovation of Pool 1A bottom. (8/88; EM)

(5) Pool 1B

As planned, Pool 1B was dewatered and kept dry during much of 1988. Renovation of the unit's interior was not accomplished due to other priorities. Unfortunately, upland species, particularly velvetleaf, became dominant. Deteriorated water control structures on the east side along the Spaulding Drain continued to limit management efforts. Wildlife use was negligible. The status of repairs to control structures and spillway is covered under Section I.1.

Young velvetleaf in Pool 1B. (6/88; EM)

(6) Pool 2

Deterioration of the north dike separating Pool 2 from the Shiawassee River continues to hamper management and water levels in this unit generally fluctuate with the river. Openings in the cattails that retained moisture produced dense smartweed. However, the drought left much of Pool 2 dry through the fall and wildlife use was limited. Funding for scheduled dike repairs was reprogrammed for higher priority Pool 1A rehabilitation. Future management of Pool 2 remains uncertain.

(7) Pool 4

Pool 4 continues to be inaccessible by land. Water levels, vegetation, and wildlife use are infrequently monitored. Water conditions generally reflect the level of the Shiawassee River. The drought left this unit dry and upland plants were interspersed with dominant cattail. Purple loosestrife appears to be encroaching along the west side of the unit. Effective management of Pool 4 will depend on restoration of vehicle access. Replacement of the Miller Road bridge, however, is unlikely in the near future.

b. Farm Bill Activities

(1) Wetland Restorations on Conservation Reserve Program Lands

Farm Bill work commenced in February with a mailing to all Conservation Reserve Program (CRP) enrollees in Sanilac County. Letters and brochures interpreted the wetland restoration program for set-aside acres. Sanilac County was selected as the trial area because it was the county with the highest number (230) of CRP enrollees in our nine county area. Of that total, thirty-seven landowners responded expressing interest in participation. A subsequent office review of respondent's CRP files revealed that at least fifteen farms looked promising for one or more restoration projects. Follow-up field inspections and meetings with landowners in March resulted in signed Landowner Agreements for nineteen restorations on seven farms.

All staff members involved in the planning and construction of wetland restoration projects attended a Wetland Restoration Workshop on May 17th in Adrian, Michigan. The workshop, which was essentially a training session, covered site identification, project planning and design, and survey procedures. All necessary survey work for the nineteen projects in Sanilac County was completed by mid-June. Assistance was provided by State Farm Bill Coordinator Len Schumann and Volunteer David Peters.

Despite setbacks resulting from a shortage of personnel (Section E.1) and equipment failure (Section I.4), nine wetland restorations on CRP lands in Sanilac County were completed in June. An additional nine projects were completed in July through a combination of force account work and small contracts. One final project in Sanilac County was completed in September under contract for a total of nineteen.

View of two wetland projects on Conservation Reserve Program tract in Sanilac County. (6/88; EM)

From early August through freezeup in mid-October, refuge maintenance workers and equipment worked on CRP wetland restorations across several counties in southern Michigan. Through this effort, forty additional wetlands identified by Wildlife Assistance and Ecological Services in East Lansing were restored for a total of fifty-nine in 1988.

Wetland restoration work continued through year's end. In December, Project Leader Prusa and Assistants Merritt and Weide met with Soil Conservation Service District Conservationists to develop an estimate of the number of restorable wetlands on CRP tracts in our nine-county area. Following office review, a representative sample of wetland sites were field checked. This effort resulted in an estimate of twenty-six physically restorable wetlands with eight projects forecasted for completion in 1989.

(2) Conservation Easements on Farmers Home Administration Inventory Properties

Twenty-nine properties were on Farmers Home Administration inventory during the year in our nine country area, and all were field inspected for existing and/or restorable wetlands. By years end, all necessary mapping, boundary description, delineation on aerial photos, and other information had been forwarded to the State Farm Bill Coordinator for processing. None had been approved by Farmers Home Administration at the time of this report.

(3) Swampbuster Consultation

Assistants Merritt and Weide responded to one request for assistance in wetland identification from the Soil Conservation Services' District Conservationist for Saginaw County. Assistant Manager Merritt provided consultation service on seven commenced conversion hearings throughout the year.

3. Forests

Forest habitat, including greentree reservoirs, consists of 4,255 acres of bottomland hardwood. Second growth, even aged stands dominated by soft maples and green ash are common. Forested habitat has been compartmentalized and, in accordance with the 1986 Forest Management Plan, 15 to 20 acres are scheduled to be selectively cut and another 5 to 10 acres clear cut every two years. Currently, this is accomplished through issuance of special use permits to local wood cutters. The status of silvacultural treatments is discussed in the following section.

a. Greentree Reservoirs (Pool 3 and 5)

Scattered areas within the north greentree were flooded in early 1988 as levels in the adjacent Spaulding Drain rose permitting gravity flow into the unit. Precipitation through the winter increased levels until much of Pool 3 and low areas of Pool 5 were inundated by early spring. Declining water levels in adjacent river systems facilitated drawdown by mid-May. Gates were inadvertently left open until only pockets of water remained and, subsequently, the drought left the greentrees very dry by mid-summer.

Fall precipitation provided only small areas of habitat and waterfowl use was extremely limited. At the close of 1988, river levels had still not been consistently high enough to permit significant influx to these units.

Silvacultural treatments in Compartment 3, which includes the north greentree, were delayed after the flood in 1986. Treatment resumed after a permit extension to December 31st was granted. However, effort by the permittee, a "weekend woodcutter", was sporadic, and wet, fall weather forced suspension of cutting operations to prevent damage to roads. Because of violations of various permit conditions, it is unlikely that these woodcutters will be considered for Special Use Permits in the future. Despite small areas of unfinished work, forest management objectives for Compartment 3 have generally been satisfied.

4. Croplands

Approximately 4,000 acres within the present-day boundary were under cultivation when acquired in 1953 and an extensive ditch and dike system had already been constructed. Most land acquisition occurred from 1954 through 1967. From 1954 until 1965, 1,500 to 2,000 acres were farmed. After a sizeable land purchase in late 1965, and continuing through 1972, approximately 3,000 acres were cultivated. Heavy crop losses from flooding during 1972 to 1976 promoted conversion to other land uses and by 1978, cropland production had been reduced to 1,700 acres. Approximately 1,650 acres were farmed in 1984 under eight cooperative agreements.

Currently, approximately 1,490 acres are committed to crop production through agreements with five cooperative farmers. The primary objective is to provide food for migratory waterfowl in spring and fall. Farming is used periodically to rejuvenate moist soil units, preventing dominance by cattails and/or woody vegetation and to set back succession. Croplands are important in accommodating the Canada goose hunting program. Most hunting occurs from blinds located in standing corn adjacent to winter wheat fields (Section H.8).

Cooperative Farming Agreements are renewed annually on all tracts. Cooperators provide all necessary farming equipment, labor, seed, and fertilizer, and conduct normal farming operations in return for the entire crop on 70% of the crop acreage for units not in the hunting program or 75% of the acreage in hunted units. The different share rates are necessary to adjust for the added work required in setting up narrow corn and winter wheat strips to accommodate hunting. Maintenance of four electric-powered pump stations along with associated drainage ditches, culverts, and structures is the responsibility of the government. Cooperators pay all electric charges for pumping associated with the farm program with the exception of one pump on Houlihan Road.

Crop rotations resulted in 772 acres of soybeans, 446 acres of corn, 138 acres of winter wheat, and 134 acres of barley planted in 1988. Rotations are designed to break insect cycles and eliminate the need for insecticides. Although yields were down from normal due to drought conditions, good soil moisture at planting time, and occasional precipitation, resulted in higher yields than in adjacent counties. Table F1 compares normal with drought-year yields and estimates food production for wildlife on 1988 refuge shares.

Table F1: Comparison of Normal and Drought-year Crop Yields and Estimated Feed Production for 1988.

Crop	Yields bu/ac. 1987 (normal)	1988 (drought)	Estimated feed production for wildlife on refuge shares in 1988: (total bushels)
Soybeans	50	30	N/A
Corn	130	80	11,600
Barley	60	40	5,360
*Winter Wheat	80	45	N/A

*Winter wheat data included for general interest only. Winter wheat is consumed as green browse by Canada geese and no grain is harvested. Winter wheat data is from county-wide figures.

Assistant Manager Merritt inspects barley field in Trinklein Unit. Despite drought conditions, this field produced average yields. (7/88; RW)

Refuge shares of corn were knocked down in December to provide late winter and early spring feed for migratory waterfowl. (12/88; EM)

9. Fire Management

Weather and other priorities limited prescribed burning efforts during the year. On April 13th, an attempt was made to burn dikes west of Pools 1A and 1B in preparation for repairs and to control woody growth. The lack of ground fuel continuity resulted in a marginal burn over an estimated 10 acres.

Prescribed burn along dike west of Pool 1A. (4/88; RW)

10. Pest Control

Purple loosestrife continues to be a major problem. Loosestrife control was stepped up this year with approximately 18 gallons of Roundup applied compared to about 1 gallon last year. Some spraying was done with a backpack sprayer but most was accomplished using the Honda all-terrain vehicle with a 10-gallon spray rig mounted on the back. Efforts were concentrated on scattered areas of loosestrife in Moist Soil Units 1 and 2 consisting of 290 acres, and Pools 1A and 1B consisting of 505 acres. Dense patches, such as the one in Moist Soil Unit 2, were not treated. Large monotypic stands of loosestrife along the Shiawassee and Cass Rivers continue to provide a seed source for areas downstream, including much of the refuge during periodic floods.

Agricultural herbicides were used by five cooperators in the farming program on soybean and corn fields. The primary target weed species were velvetleaf, cocklebur, nightshade, and foxtail. Efforts continued to encourage cooperators to explore alternatives to herbicides, and the use of insecticides is prohibited. Attempts to minimize herbicide use through banded applications at minimum rates, crop rotations, cover crops, and increased cultivation continue. In addition, beginning in 1989, only herbicides listed on the Region 3 Advanced Approved List will be permitted.

Loosestrife patch in Moist Soil Unit 2. (7/88; EM)

12. Wilderness and Special Areas

Wilderness and Special Use Areas administered by Shiawassee will be covered under Section M.

G. WILDLIFE

1. Wildlife Diversity

Waterfowl maintenance is the major objective at Shiawassee National Wildlife Refuge. Managed marshes, moist soil units, greentree reservoirs, and farm units provide habitat for thousands of ducks, geese, and swans during spring and fall migrations. A variety of other wildlife such as shorebirds, wading/marsh species, raptors, furbearers, deer, and small mammals also benefit from waterfowl habitat management.

Forests and grasslands also provide habitat for a variety of wildlife. Songbirds are probably the most noticeable species occupying these habitats. Forest management practices, initiated in 1986, may increase passerine density/diversity and favor deer and small mammals. Prescribed burns of grassland units and dikes and mowing early succession habitats have the potential to further enhance wildlife diversity.

2. Endangered and/or Threatened Species

Bald eagles, federally listed as threatened in the State of Michigan, were a common sight. The mid-winter bald eagle survey, coordinated by the National Wildlife Federation, was conducted January 8th and resulted in eleven immature eagles sighted, which is consistent with prior years. Once again a pair of eagles returned to the nest near the Cass River and successfully raised one eaglet. The eaglet was banded on May 26th by Jack Holt under contract by the Michigan Department of Natural Resources. The eagle's nest is in a large dead cottonwood tree. Mr Holt is concerned about climbing the tree if the nest is successful next year.

A peregrine falcon was observed hunting shorebirds near Moist Soil Unit 1 in late September by Volunteer David Peters. Several short-eared owls, listed as endangered by the State of Michigan, were observed regularly late in the year. No other threatened or endangered species were observed this year.

Moving into position to band eaglet. (5/88; TP)

3. Waterfowl

a. Geese

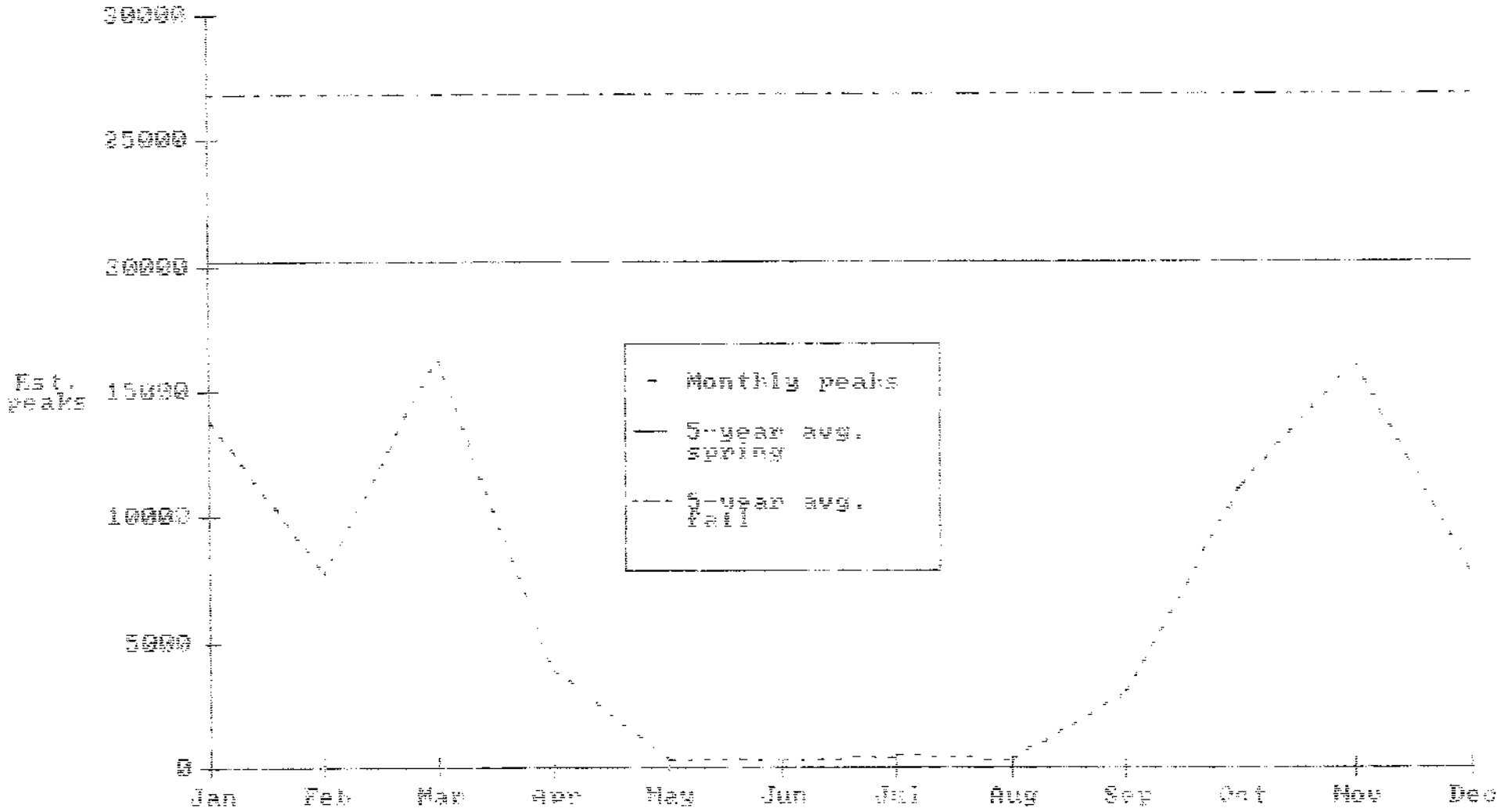
Due to mild winter temperatures and little snow cover, over 13,000 Canada geese remained until late January. Local food supplies, primarily waste grains, were depleted by early February and most geese moved out of the area.

Canada geese along Shiawassee River - struggling to keep water open. (1/88; RW)

By late March, numbers of north-bound geese were beginning to build and an estimated peak of 16,000 was reached on March 23rd, which was a 21% decrease from the average (Figure G1). Geese continued to pass through as spring progressed but by May only resident giant Canadas remained. Resident birds, numbering about 200, produced an estimated 142 goslings.

Goose nesting on muskrat house in Moist Soil Unit 2. (7/88; EM)

FIGURE C1. 1988 MONTHLY CANADA GOOSE PEAKS COMPARED TO 5-YEAR AVERAGES.



Goose numbers remained low all summer until early September when migrants began to appear. Goose numbers gradually increased to a fall peak of 16,000 on November 9th, which was a 40% decrease from the 5-year average (Figure G1). Geese began leaving the area by early December. By the end of the year there were still about 8,000 present.

Snow geese were present in low numbers again this year with four observed on March 23rd and a fall peak of 144 on November 9th. Two white-fronted geese, well out of their normal range, were observed in late October mixed with a flock of Canadas.

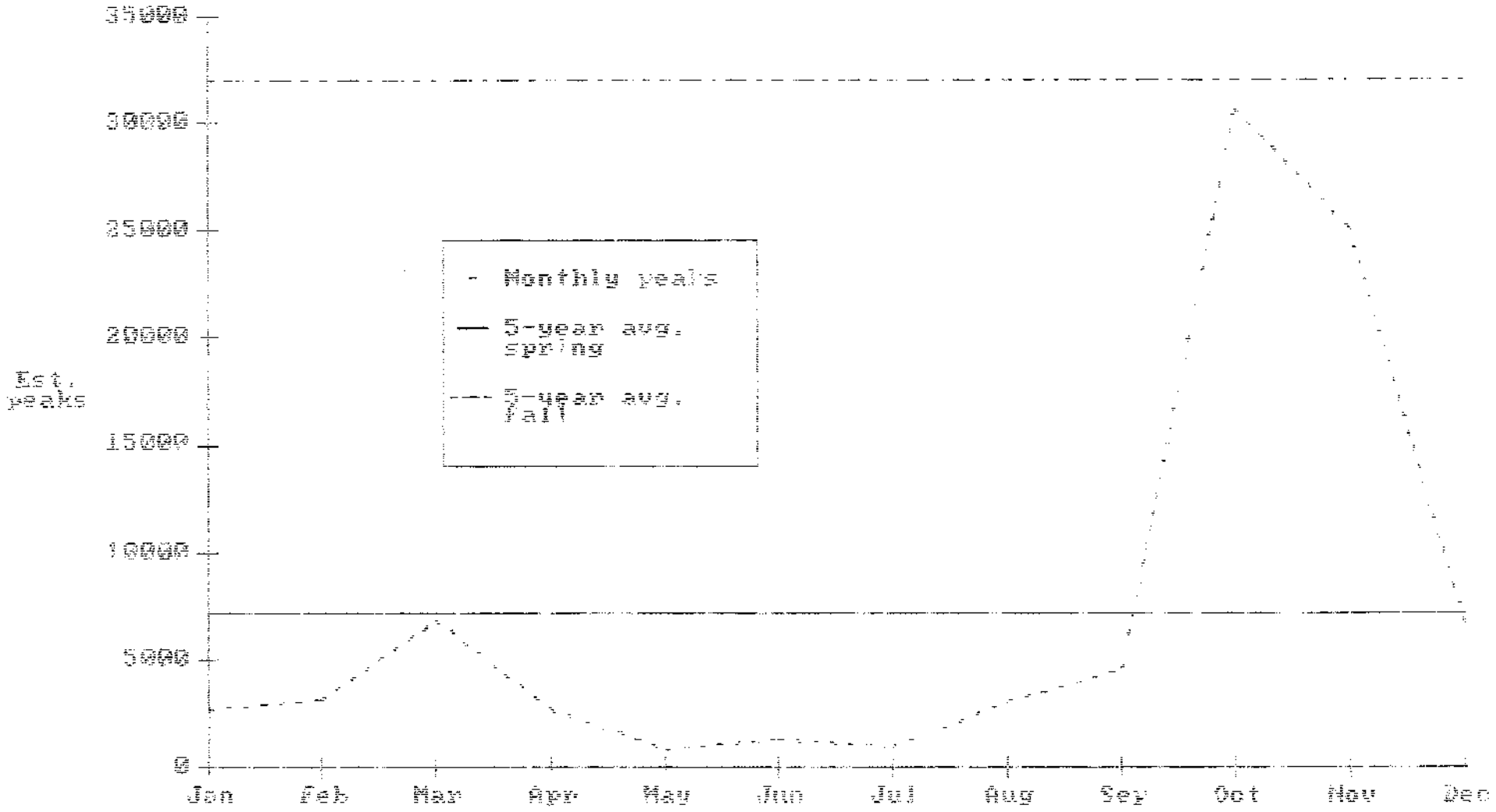
b. Ducks

Several thousand ducks used small areas of open water in January and February, primarily mallards, black ducks, and common mergansers. A variety of ducks, both dabblers and divers, passed through on their way north contributing to a spring duck peak of 7,000 on March 23rd, which was a 2% decrease from the 5-year average (Figure G2).

Approximately 60 acres were searched for nests this spring with two mallard nests found. Both were later predated, probably by raccoons.

Predated mallard nest. (6/88; RW)

FIGURE G2. 1988 MONTHLY DUCK PEAKS COMPARED TO 5-YEAR AVERAGES.



Brood surveys indicated that production included at least 148 mallards, 202 wood ducks, and 7 blue-winged teal and was comparable to other years. Of the eighteen nest baskets available, only one in Pool 1A was used. Unfortunately, this mallard nest was later found abandoned. Because the eggs were in a later stage of incubation and were undamaged, the hen may have been predated while off the nest. There was no other evidence of nest basket use in 1988. Fewer than 1,000 ducks were present by mid-summer.

Biological Technician John Hart adding straw to mallard basket. (5/88; RW)

By late August black ducks and blue-winged teal began arriving. Green-winged teal began to appear in late September and peaked at 563 on October 7th. Mallards continued to pour in until total ducks reached a peak on October 26th of 31,000, which was a 3% decrease from the 5-year average (Figure G2). This was close to the 1987 peak of 32,000 which occurred on October 21st. Common mergansers began to appear along the Shiawassee River in mid-October. By early December their numbers were estimated at 3,000, far below last years peak of 15-20,000. Total waterfowl using the refuge at year's end numbered about 10,000.

Waterfowl continued to concentrate along the Shiawassee River at year's end. (12/88; RW)

c. Swans

Tundra swans first began to arrive in mid-March, peaked at 512 on March 16th, and were on their way north again by the end of the month. They stopped again briefly in the fall peaking at 125 on November 1st. These dates and peak numbers were similar to previous years.

4. Marsh and Water Birds

Overall marsh and water bird use was down in 1988 as in 1987 due to dry conditions. Traditional areas for wading birds such as Pools 1A and 1B and Pool 2 were dry most of the summer and early fall. However, as these were drying up, small puddles of water left behind concentrated fish and amphibians, attracting large numbers of great blue herons and great egrets. Another positive effect of the drought was lower water levels in the Shiawassee and Cass Rivers making many more areas accessible to wading species.

Another effort was made to find the traditional great blue heron rookery. The south greentree reservoir and other probable areas were checked for great blue heron nest activity. No active or old nests were found. The last recorded heron rookery was in 1982 when 107 active nests were observed in Pool 5. Great blue herons are still common, peaking at 128 in July, so apparently they are nesting elsewhere. The adjacent State Wildlife Area has reported an active heron rookery in recent years.

Black-crowned night herons were observed weekly from mid-summer until early fall with a peak of five. Other, more secretive marsh birds such as the green-backed heron and sora rail were observed occasionally throughout the summer. Double-crested cormorants were a familiar sight along the Shiawassee River during spring and fall migrations.

5. Shorebirds, Gulls, Terns, and Allied Species

With approximately 3,600 acres of wetlands Shiawassee provides habitat for many shorebirds, both summer residents and more transient species. Overall shorebird numbers were down, particularly pectoral sandpipers. Spring peaks were 1,000-2,000 in the early 1980's but only peaked at 169 this spring.

Killdeers, pectoral sandpipers, and lesser and greater yellowlegs began arriving in mid-April, taking advantage of seasonally wet areas. Dunlins peaked in late May at 550 and semi-palmated sandpipers in early June at 600. From late June through July shorebird activity slowed but began to pick up with the arrival of migrants in the second week of August, predominantly dunlins and yellowlegs. Semi-palmated sandpipers passed through the area in early September peaking at 350. Two species which rarely occur here, the red knot and red-necked phalarope, were observed by Volunteer David Peters in late August. Another rare visitor was a Hudsonian godwit observed in May and October.

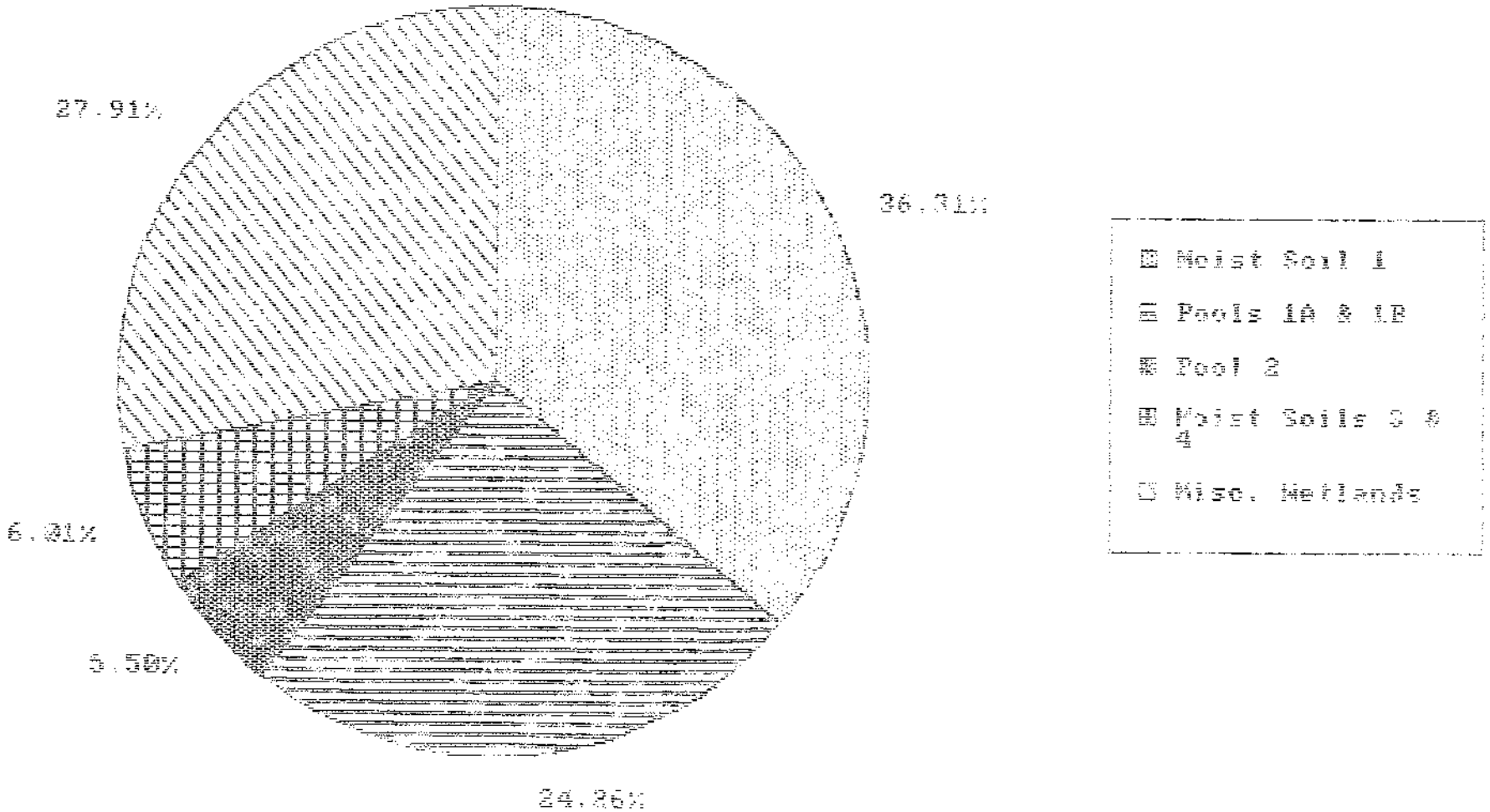
The evaporative drawdown of Moist Soil Unit 1 in May and shallow reflooding in early June provided excellent habitat for migrating shorebirds. The subsequent drying out of Moist Soil Unit 1 and most other wetlands accommodated further shorebird use by various species throughout the summer. The drought of 1988 lowered the level of the Shiawassee River such that at times of strong west or southwest winds, extensive mudflats were exposed making these previously inaccessible areas available to shorebirds.

As indicated in Figure G3 Moist Soil Unit 1, which makes up only 4% of total wetlands, accounted for over one-third of shorebird use. While this unit was intensively managed for waterfowl, use by shorebirds, as well as marsh/water species, demonstrates the value of moist soils to wildlife diversity. The addition of new moist soils units, with staggered drawdowns and varied successional stages, can only further enhance avian density/diversity.

6. Raptors

Red-tailed hawks, bald eagles, and northern harriers are the most frequently observed raptors. Turkey vultures are seasonally common. As mentioned in Section G.2, a pair of bald eagles successfully nested near the Cass River. Great-horned and barred owls are relatively common. There were two active great-horned owl nests along the Shiawassee River near the mouth of the Cass River. Short-eared owls, which are uncommon visitors, were sighted in March, November, and December, and kestrels were seen occasionally. Other uncommon species sighted were rough-legged hawks, Cooper's hawks, and a peregrine falcon.

FIGURE 23. 1988 SHOREBIRD USE OF SELECTED REFUGE WETLANDS.



8. Game Mammals

The white-tailed deer is the most common game mammal. An aerial survey over the Federal and State management areas on January 27th yielded about 350 deer, which was a dramatic increase from the 43 deer counted in early 1987. Dry conditions in 1988 allowed greater access to formerly flooded habitats and, as always, food was readily available. As in 1987, production appeared excellent with a recruitment rate approaching two fawns per adult doe. An estimated 750 deer may have been present on the State/Federal complex going into the fall hunting season. All concerned parties, including State/Federal Managers and private interests, have finally agreed that the "post-season" or winter population should not exceed 500-600 animals.

Miscellaneous small game mammals can also be found. These include frequent sightings of fox squirrels and less often sighted cottontail rabbits. Populations of furbearers at year's end have been estimated at: muskrat, 150; beaver, 15; raccoon, 375; and red fox, 25.

10. Other Resident Wildlife

Several ruffed grouse were seen this year which is a rare occurrence. The recent upward trend in grouse populations may be forcing this species to use relatively marginal habitats. Ring-necked pheasant sightings are increasing. The drier habitat conditions in 1987-88 is probably favoring upland game birds.

15. Animal Control

A local retired resident, very familiar with the refuge, volunteered to assist with the spring woodchuck control effort. An estimated 500 gas cartridges were used along dikes and roads making a sizeable dent in the population of this destructive rodent. A similar effort is planned for next year. Predators, particularly raccoons, were again a concern near duck traps; control efforts are discussed under Section G.16.

Depredation on private cropland by "refuge deer" flared up again after several years of relative calm. Control included a food plot near private farmland, planted by the affected farmers, and plans for a "deer-proof" electric fence on private land along a key boundary.

16. Marking and Banding

Between September 5th and September 28th, 112 black ducks were banded including 64 adult males, 30 adult females, 11 immature males, and 7 immature females. As in 1987, this fell short of the station quota of 200 black ducks. In addition, there were 44 recaptures, 12 killed by raccoons, and 12 adult males released unbanded because the quota had already been met. Other species accounted for another 51 ducks trapped. Because of inherent difficulties trapping black ducks, particularly the limited numbers usually present, the Banding Lab has been requested to reduce the station quota.

Trapping effort has traditionally focused on the northern half of Pool 1A where black ducks begin to concentrate by late August. Over the last few years, only floating traps were used due to their relative attractiveness to black ducks. Swim-in traps were avoided due to poor water clarity and excessive depth. This year Pool 1A was drained to eliminate carp and allow renovation of the bottom. Subsequent attempts to reflood the unit were hampered by continued low water in area rivers. Precipitation and limited pumping filled depressions to a depth of about 10 inches by early September. This allowed limited use of floating traps and, with the absence of carp and improved water clarity, some experimentation with swim-in traps. Because of the limited habitat in Pool 1A, floating and swim-in traps were also placed in wetland habitats immediately northwest of Pool 1A. Figure G4 summarizes the relative success of swim-in versus floating traps.

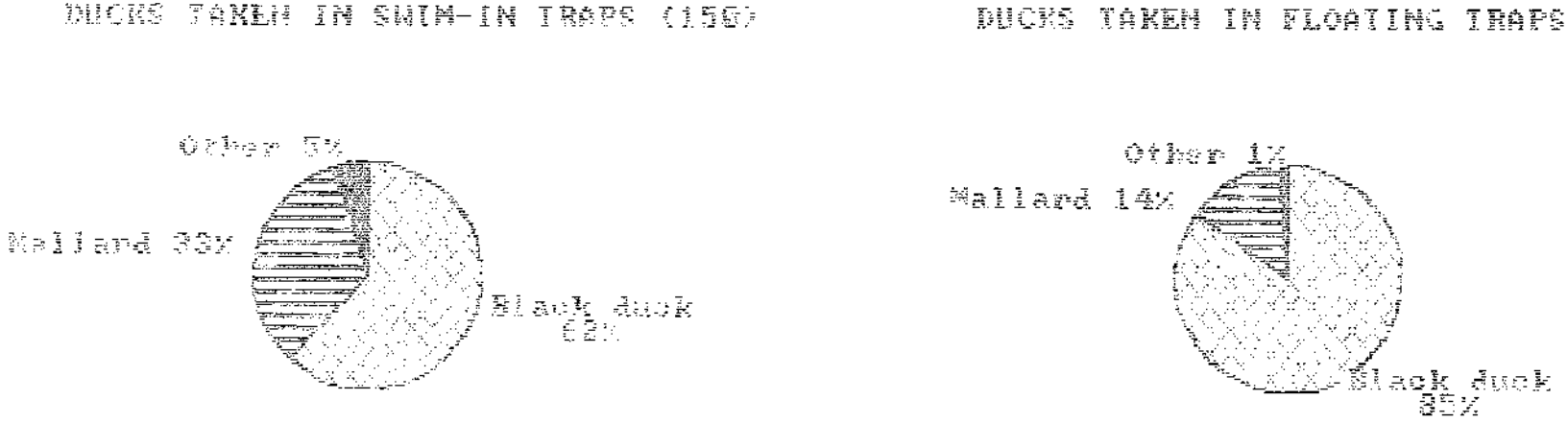
The following trap design guidelines were developed by Biological Aid John Hart after extensive trial and error:

a. Floating Trap (entrance)

The entrance should be of chicken wire in a general funnel shape with symmetry not important. Approximate dimensions recommended are 7-8 inches long, 5.5 inches high, 6 inches at the mouth, and 4 inches at the small end of the funnel. The bottom of the funnel should be cut away and with the sides touching the floor of the trap forming more of a "tunnel".

Floating trap with black ducks in Pool 1A. (9/88; RW)

FIGURE G4. Relative success of swim-in versus floating traps.



b. Swim-in Trap

While very productive, the swim-in traps were less successful for black ducks than floating traps. A relatively stable water level and good water clarity seemed important. The traps worked well in 3-12 inches of water with 6-8 inches probably optimum. "Heart" or "kidney" shaped traps made from welded wire performed well. Entrances should be of chicken wire about 6 inches long, 6 inches high, and 6 inches wide at the mouth with the small end formed into a dome about 4 inches wide and 4.5 inches above the water level. In areas with a soft bottom, traps should be moved slightly every day or two to prevent ducks from escaping through tunnels under the wire created by ducks or duck trappers feet. Also, waterfowl feeding just outside the entrance may cause a drop-off in front of the trap discouraging ducks from entering or making escape from the trap easier.

If water clarity remains good in Pool 1A, the use of a "salt plains" trap is recommended in the future.

Biological Technician Hart securing net over swim-in trap. (9/88; RW)

Swim-in trap showing entrance. (9/88; RW)

Predator-related mortality was minimized by using a #220 conibear in front of a baited 5-gallon plastic pail. Slots cut into the pail top helped stabilize the trap. This set can be made on shore near a trap site or in up to 3-4 inches of water. Sets should be far enough from duck traps and areas heavily used by waterfowl to minimize investigation by curious ducks and geese. A fish or predated duck were the most effective baits.

H. PUBLIC USE

1. General

Public use appeared to be down 22% from the 1984-1987 average (Table H1). Record high temperatures associated with the drought of 1988 may have been a factor. However, prior to the installation of traffic counters in 1988, estimates may have varied widely as the interpretation or perception of public use changed, particularly in response to personnel turnover. Total annual visitation trends from 1979 to 1988 are shown in Table H2.

Table H1 - 1988 Monthly Refuge Visits Compared to 1984-1987 Averages

Month	1984-1987 Average	1988	% Change
January	2,737	928	-66
February	2,586	900	-65
March	3,114	1,373	-56
April	3,124	1,875	-40
May	3,971	7,062	+78
June	2,079	3,318	+60
July	1,711	1,280	-25
August	2,325	1,278	-45
September	3,089	1,585	-49
October	5,797	4,620	-20
November	2,522	1,809	-28
December	2,188	1,308	-38
	35,173	27,336	-22

Table H2 - Total Refuge Visitation, 1979-1988 (rounded to nearest thousand)

1979 - 32,000	1984 - 66,000
1980 - 41,000	1985 - 29,000
1981 - 53,000	1986 - 33,000
1982 - 59,000	1987 - 28,000
1983 - 71,000	1988 - 27,000

7. Other Interpretive Programs

The following involved structured environmental/wildlife education provided by non-service personnel:

Date	School/Group	Number
5-19-88	New Lothrup Elementary	20
9-26-89	New Lothrup Elementary	20
10-25-88	St. Lorenz, Frankenmuth High School	72

Non-structured tours/wildlife information, provided by Service personnel and volunteers included:

Date	School/Group	Number
3-25-88	Hamady Middle School, Flint	90
3-26-88	Oakland Audubon	40
3-26-88	Jackson Audubon	10
4-02-88	Green Point Nature Center	30
4-09-88	Hope Lutheran Church, St. Charles	6
5-05-88	Ecology Class, UM-Flint	22
5-06-88	Bridgeport Baptist Academy	300
5-26-88	Biology Class, Saginaw Valley College	10

6-17-88	Washington Avenue, Presbyterian Church	18
9-13-88	Conservation Class, Chesaning High School	46
9-14-88	Wildlife Class, Central Michigan University	7
9-15-88	Saginaw Walleye Club	5
9-22-88	Northeastern and Jefferson Intermediate Schools	16
10-01-88	Wetlands Class, Michigan State University	21
10-04-88	Shiawassee Agricultural Council	15
10-20-88	Francis Reh Academy	25
10-25-88	Wildlife Class, Central Michigan University	6

Hamady Middle School, Flint. (5/88; RW)

Black duck banding with wildlife class from Central Michigan University. (9/88; JH)

Off-refuge programs by station personnel included:

Date	School/Group	Number
5-10-88	Michigan Duck Hunters	30
9-06-88	Michigan United Conservation Clubs	50
10-05-88	Friendly Forest Day Care	50
11-10-88	Bay City Audubon	25

8. Hunting

a. Waterfowl

The goose hunt ended with a total harvest of 965 Canada geese, a decline of 24% from the 1987 hunt (Table H3). Based on 1,698 hunter visits, average success was 57%, compared to 72% in 1987. Figures H1 and H2 show goose harvest and hunter success trends. Goose numbers using the refuge during the hunt were generally down this year (Section G.3.a). Harvest on the larger Goose Management Area, of which Shiawassee NWR is a part, was down about 10% from last year.

Table H3 - Shiawassee NWR Managed Goose Hunt Data, 1978-1988

Year	No. Hunting Days	Hunter Visits	Refuge Harvest	Management Area Quota	Quota Reached
1978	28	1,576	415	2,500	No
1979	16	1,532	909	2,500	Oct. 31
1980	28	1,991	692	3,000	No
1981	27	1,410	319	3,000	No
*1982	16	1,444	1,409	3,000	Oct. 17
*1983	31	2,120	1,587	5,000	No
1984	21	1,603	959	5,000	No
*1985	23	1,719	901	5,000	No
1986	14	349	184	5,000	No
*1987	23	1,764	1,263	4,500	Yes
*1988	23	1,698	965	4,500	No

*Daily bag limit - 2; all other years, daily bag limit - 1.

The Shiawassee hunt ran twenty-three consecutive days beginning October 1st. A limit of five geese was allowed but only two could be Canadas. Pre-registered permits were required the first two weeks due to the hunt's popularity. The final week is managed using an open-draw system. Traditionally, hunter interest diminishes as success drops during the last week, and most hunters who show up are successful in drawing a blind.

FIGURE H1. SHIAWASSEE NWR GOOSE HARVEST 1979-1988.

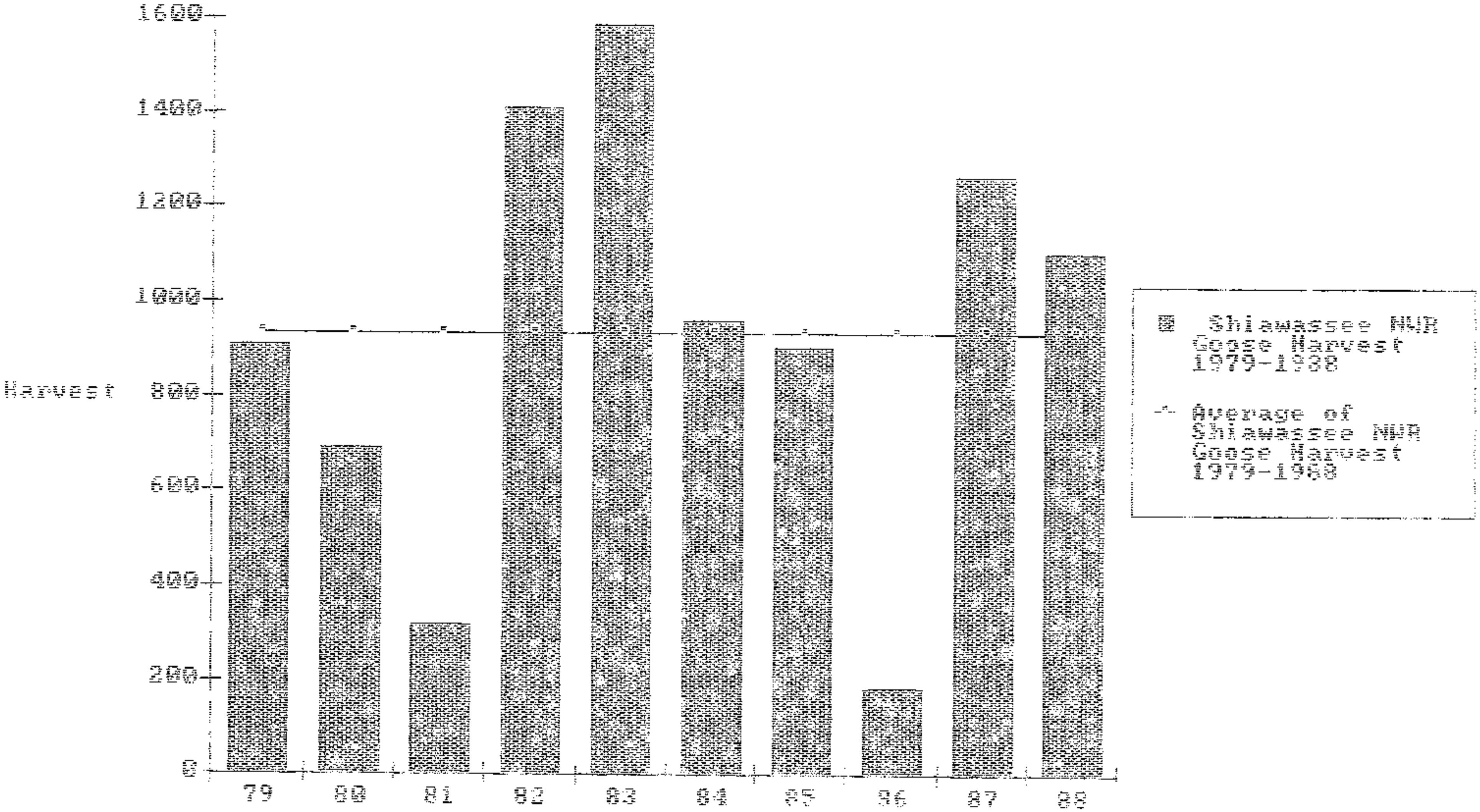
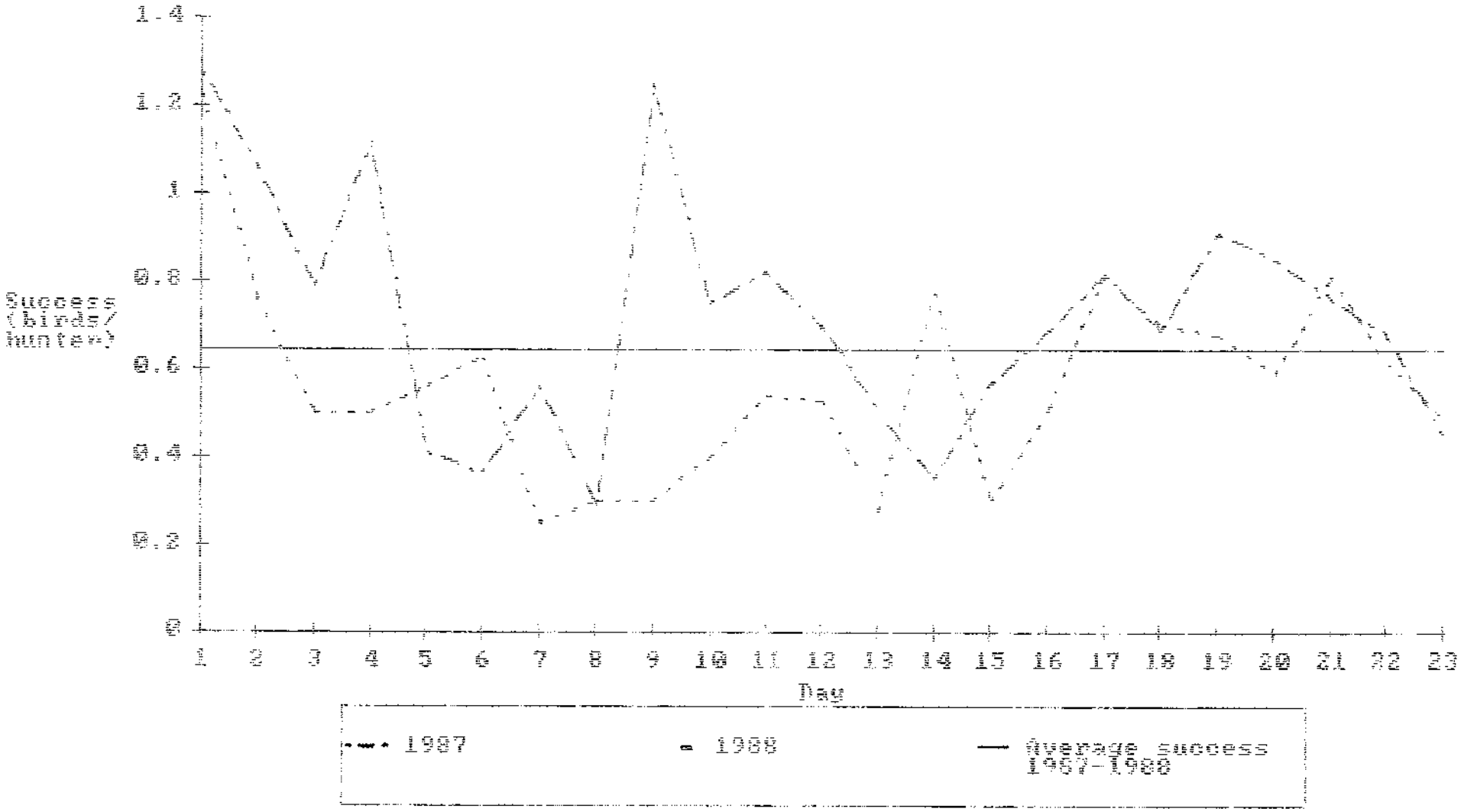


FIGURE #2. SWANNASSET MAR GOOSE HUNT SUCCESS (1987 AND 1988)



Goose hunt applications were processed and permits issued by the Department of Natural Resources in Lansing. A $3.00 fee per applicant was required by the State to cover administrative costs. Information concerning season dates, hunt areas, and other regulations was incorporated into the Michigan Waterfowl Hunting Guide. The State provided a computer printout of hunters issued permits for the Federal hunt.

The hunt is intensively managed with a hunter orientation and drawing at 5:30 A.M. and mandatory check-in by 1:00 P.M. Thirty-five field blinds were available again this year with a maximum of three persons per blind. All blinds were in standing corn adjacent to a lure crop of winter wheat. In addition, up to eight parties were allowed access to the Shiawassee River by boat for a "scramble-type" goose hunt. Morning only hunting gives the birds a "rest" in the afternoon and allows the trail system to reopen at 1:00 P.M.

Hunter orientation and drawing in check station during goose hunt. (10/88; RW)

Traditionally, the Federal refuge is hunted only part of the goose season set by the State. Reasons include the added cost of staffing the check station after hunter success and interest decline, the increased risk of exceeding management area quota, and decreased opportunity for non-consumptive public use of the trail system. Sanctuary provided by the refuge when most other areas continue to hunt has also been considered.

The second week-end of the hunt was again reserved for youth only. Up to two licensed youth between 12-17 years of age were permitted to hunt from each blind. An adult supervisor, who was not permitted to hunt, was required to accompany each youth party. Turnout was better than last year with thirty-six on Saturday and twenty-three on Sunday. Although hunter success was low at 30% for the week-end, all seemed to enjoy the experience.

Typical goose decoy spread near blind in corn. (10/88; RW)

An estimated 440 acres, including Pool 4 and adjacent wetlands, is managed by the State for waterfowl hunting under a cooperative agreement. Close proximity to the State Game Area and the relative inaccessibility of Pool 4 from the rest of the Federal refuge without a boat resulted in this agreement. A total of 250 ducks and 137 geese were harvested from this area in 1988.

Refuge staff again collected morphological data from harvested geese to assist the State in a study of the proportion of different races in the harvest. The contribution of giant Canada geese to the total harvest, and the impact of this contribution, has been a source of debate in Michigan. Culmen measurements can now be used with reasonable accuracy, to distinguish giant Canadas from the interior race. This contrasts with the 1987 effort which involved additional measurements and an increased sample size.

b. White-tailed Deer

Management of the "Shiawassee Flats" deer herd, including harvest objectives, was again worked out cooperatively with the State this year. A harvest of about 200 deer, including 30% anterless, and split evenly between the State and Federal refuges, was finally agreed to by all government and private interests concerned. However, in contrast to the last several years, Shiawassee NWR handled Federal permit-related functions independent of the State.

The entire refuge was open to archery hunting by permit during the month of December. Applicants could select from nine 3-day hunt periods and were required to indicate a buck or anterless preference or whether they had "no preference". The "no preference" designation indicated only that the applicant would accept either a buck or anterless permit. Seventy buck and thirty anterless permits were issued for each hunt period for a total of 900 permits.

Early hunts on the State area were monitored closely to allow for adjustment in the late season Federal hunt and insure that the anterless quota for the complex would not be exceeded. To help document harvest and hunter effort on the Federal refuge a stamped, self-addressed survey card was attached to each permit application. All permit holders were required to return their survey card regardless of whether they actually hunted. Based on returned survey cards, the estimated twenty-six deer harvested on Shiawassee in 1988 included eighteen bucks and eight does, well below the objective of 100 deer. Using an estimated 1,095 hunter visits, success was between 2 and 3%. While only 65% of permit holders returned their survey cards it is unlikely that many of those not responding actually hunted. Based on this assumption the average "no-show" rate, considering all hunt periods, was 46%.

The low deer harvest probably resulted from an insufficient number of permits. At least two factors were responsible for the decision to issue only 900 permits: (1) the rate at which permit holders would fail to actually participate in the hunt was underestimated and (2) hunter success was greatly overestimated.

10. Trapping

Trapping effort and harvest were down 50% and 63%, respectively, from 1987 levels. Only 468 muskrats were taken this year compared to 1,266 in 1987. Production and survival of some furbearers, particularly muskrats, was limited by the drought in 1988. Relevant 1988-89 trapping data is summarized in Table H4 below.

Table H4 - 1988-1989 Refuge Trapping Data Summary

	Ditches	MSU 3&4	Pool 4	River Marshes	Totals
Muskrat	192*	62	46	168	468
Raccoon	1	3	9	5	18
Beaver	5*	6	0	6	17
Opossum	0	1	0	0	1
Fox	0	3	0	2	5
Mink	0	1	0	1	2
Total Hours	130*	125	52	86	393
High Bid	$ 450	$ 110	$ 232	$ 425	$ 1,217

* Includes 5 beavers, 6 incidental muskrats, and 30 hours from 1988 spring season.

17. Law Enforcement

Law enforcement problems were minimal in 1988. Violations were limited to two unplugged shotgun cases, the first just off the refuge within the Little Prairie Hunt Club, and the second on the refuge during the goose hunt. A vehicle was broken into during the late season archery hunt and a compound bow and deer harvested on the refuge were stolen.

Vandalism, especially on the north side, seemed to increase. The Willing Road gate was completely destroyed and had to be replaced. The entrance sign at the Stroebel Road trail access was severely damaged and was taken down. After hours parties at the Stroebel Road parking lot became a significant problem as high school graduations approached. A gate was finally installed and local law enforcement personnel and concerned refuge neighbors assisted with the opening and closing. Night patrols will be stepped up in 1989.

Vandalism at Stroebel Road trail access. (7/88; TP)

I. EQUIPMENT AND FACILITIES

1. New Construction

Several major construction projects required considerable staff involvement and resulted in significant progress toward meeting objectives. They are as follows:

a. Flint River Erosion Control Project

Flood control is one of the primary purposes for which the refuge was established. The Flint River Erosion Control Project, which is essentially a flood control project for the lower reaches of the Flint River, commenced with dike work, Phase I, progressing to the south boundary. Phase II will include construction of a new dike, approximately 6,020 feet in length, located along the east side of the Spaulding Drain entirely on refuge property.

Although Phase II construction has been delayed pending issuance of a right-of-way easement by the Service, considerable construction planning and coordinating involving the staff occurred. On March 23rd, the Flint River Dike Committee met with newly arrived Refuge Manager Prusa and Primary Assistant Merritt to provide an orientation to the project. A second meeting to review technical construction plans was conducted on May 11th-13th. In attendance were representatives of the Flint River Dike Committee, R.C. Engineering of Saginaw, Spaulding Township, Regional Office Engineer John Ramsour and Facilities Management Engineer Technician Doug Johnson, and the refuge staff. Construction design modifications were agreed upon and Service requirements for issuance of a right-of-way easement were communicated. Planning and coordination of this construction project, which required considerable effort, continued through years end.

b. Road Surfacing

A pre-construction meeting was conducted on May 19th with Contractor Champagne and Marx to discuss implementation of a 13-mile road surfacing contract. The bid of $109,413 was covered by flood damage supplemental funds. The problem of a weight restriction on the Curtis Road bridge, the only access to the worksite, was discussed. It was agreed that the entire 13,000 tons of gravel required would be transported over the bridge in 7-yard loads rather than delaying the project.

Replacement of flood washed gravel on 13 miles of road was covered by supplemental flood damage funds. (5/88; EM)

Gravel hauling and spreading commenced on May 24th with as many as thirty-five trucks operating. By late June, approximately 85% of the gravel had been delivered and tailgate spread on roads and dikes. The job was completed on July 8th. This job required the full-time attention of one refuge equipment operator for twenty-one work days to collect weight slips and rough-shape material. Contracts for gravel jobs of this magnitude should include rough-shaping.

Spreading and rough shaping was accomplished force account. (6/88; EM)

c. Moist Soil Unit 3 and 4 Development

After years of frustration and delay due to severe intermittent flooding and abnormally wet ground conditions, significant progress was achieved toward the development of Moist Soil Units 3 and 4. Once "on line", this project will add a high level of management capability to 163 acres of moist soil units and 155 acres of shallow emergent marsh. The $250,000 development consists of exterior and crossdike construction, placement of three major water control structures, and construction of a pump station. A two-part description of progress, each in chronological order, follows:

(1) Part 1 - Crossdike and Exterior Dike Construction

The contract with Misteguay Creek Farms for exterior dike construction on Moist Soil Units 3 and 4 was discussed extensively and changes were agreed upon during meetings with Fred Beauvais and Max Boyle, Engineering, and Doug Johnson, Facilities Management, conducted on May 11th-13th. Changes included rerouting and/or eliminating sections of the exterior dike and relocating the pump station. These changes resulted in an increase in water manipulation options available to management. Because of these changes it was necessary for Bill Greenwalt, Engineering, to visit and re-survey the units for a contract change order so that construction could begin. The survey was accomplished on May 25th-27th.

Contractor Champaign and Marx finished reshaping and hydroseeding work on the Moist Soil Unit 3 and 4 crossdike in June. This work was carried over from a 1987 contract. In addition, stoplogs and pullers for the crossdike water control structure were delivered thus fulfilling the terms of the contract.

Reshaping and spreading topsoil on Moist Soil Unit 3 and 4 crossdike. (5/88; EM)

Moist Soil Unit 3 and 4 crossdike after hydroseeding.
(6/88: EM)

Additional survey work for the exterior dike, water control structures, and pump station was accomplished by Engineers Fred Beauvais and Erin McFadden on June 20th-22nd. On July 25th, changes in the exterior dike contract were discussed at a meeting between Contractor Don Albosta, Misteguay Creek Farms, Refuge Manager Prusa, and Primary Assistant Merritt. Problems were resolved and a preconstruction meeting and worksite inspection was conducted for the project by Engineer Fred Beauvais on August 24th.

Dike construction began on September 6th. Cooperative weather and a Contractor with the equipment and personnel to get the job done resulted in good progress. A final inspection in early October cleared all earthwork, seeding, and mulching on the contract with Misteguay Farms for development of Moist Soil Unit 3 and 4.

Construction of Moist Soil Unit 3 and 4 low level exterior dikes by contractor Misteguay Farms. (9/88; EM)

Final shaping of ditchbanks. Note: finished low level dike on right. (9/88: EM)

(2) Part 2 - Pump Station and Water Control Structures

A preconstruction meeting was conducted by John Ramsour, Regional Engineer, with Contractor Champaign and Marx on October 5th. Contract requirements were outlined for construction of the pump station and water control structures necessary to complete the Moist Soil Unit 3 and 4 project. Work commenced on October 19th. Unusually warm weather, in conjunction with the use of insulation and portable heat, permitted cement work at the pump station to continue within temperature guidelines. At years end, the two major water control structures were placed and all excavation and cement work for the pump station was completed. The following sequence of photos record construction steps for the pump station and control structures.

Contractor Champaign and Marx excavated a hole approximately 18 feet deep and 30 feet wide to accomodate pump station foundation work. (10/88: EM)

Cement placement for the foundation was accomplished using an excavator bucket. (11/88; EM)

Subcontractor Wobig Construction laborers complete form work for upper section at pump house. (12/88; RW)

Preparation work for final cement placement. (12/88; RW)

The use of insulation, cover tarps, and portable heat were necessary during final pouring due to deteriorating weather conditions. (12/88; EM)

Contractor Champaign and Marx completed installation of three water control structures in the development of Moist Soil Units 3 and 4. (11/88; EM)

Final shaping and rip rap placement at water control structure outlet. (11/88; EM)

d. Office Remodeling

Construction and installation of new cabinets, a reception counter, and publication rack at headquarters was accomplished by Maintenance Mechanic Blazo and Green Thumb enrollee Lichtenwald in March. These additions have enhanced the appearance of the visitor contact area.

Green Thumb Enrollee Alex Lichtenwald works on new cabinets for the visitor contact area. (2/88; RW)

2. Rehabilitation

a. Pools 1A and 1B

Meetings with Engineering and Facilities Management staff in May (Section I1) included a review and reprioritization of all flood damage projects. It was agreed that from a resource perspective the rehabilitation of Pools 1A and 1B should be top priority for flood damage repair. In order to ensure that sufficient dollars were available to accomplish the necessary work, the Pool 2 renovation was dropped and funds reprogrammed. The Pool 1A/1B project consists of exterior dike and spillway renovation, and replacement of two screwgates.

Discussion of resource priorities for flood damage supplemental funding with Regional Office Facilities Management and Engineering staff. (5/88; RW)

Extensive flood damage to Pool 1A and 1B dikes since the original survey resulted in a new survey being necessary for issuance of a contract. John Glanton, an Engineer working under a contract, and crew conducted a new survey of the Pool 1A and 1B exterior dike and crossdike spillway on June 20th-21st and completed all necessary surveys needed for contracting to proceed.

John Glanton and crew surveying Pool 1A and 1B dike in preparation for rehabilitation. (6/88; EM)

A preconstruction meeting and worksite inspection for rehabilitation of the Pool 1A/1B spillway and Pool 1B screwgate replacement was conducted on October 5th by John Ramsour, RO Engineering, with Contractor Champagne and Marx. This work was combined with the Moist Soil Unit 3 and 4 pump station and water control structure contract described under Section I1. Spillway rehabilitation work commenced in December but was terminated at year's end due to frozen ground conditions. Hopefully, the spillway and screwgate work can be completed early in 1989.

Plans and specifications for rehabilitation of the Pool 1A exterior dike were received from Engineering for review and comment at year's end.

b. Moist Soil Unit 1 and 2 Utility line

A coordination meeting was held with Consumers Power Company on March 21st to discuss a problem with the utility line servicing the pump for Moist Soil Units 1 and 2. The line was leaning badly and the resetting of several utility poles was necessary. It was agreed that water levels in Moist soil Unit 1 would be drawdown to facilitate the work. Resetting of the utility poles was completed in April. Despite low water levels, problems with equipment bogging down were encountered.

Consumers Power Company resetting utility poles in Moist Soil Unit 1. (4/88; TP)

3. Major Maintenance

Hasselbeck Electric Company of Saginaw conducted the annual inspection and calibration of all irrigation pumps in March. In addition, an electrical problem at the pump for Moist Soil Units 1 and 2 was corrected. The irrigation pump at Houlihan Road required major maintenance in October including replacement of two starter motor capacitors. This service was provided by Duperon Corporation of Saginaw. Other major maintenance of structures and facilities included the following:

-- Favorable spring weather in early April permitted grading of several miles of roads in the maintenance shop area and Trinklein Farm Unit.
-- The chimney and burner for the furnace in the Wildlife Check Station were replaced.
-- The residence was cleaned, repaired, and general maintenance was performed including the installation of a new water heater.

4. Equipment Utilization and Replacement

Routine operations, major flood damage repair, and Farm Bill activities resulted in a challenging year. The station bulldozer, backhoe, dump truck, and transport trailer were used to restore wetlands on Conservation Reserve Program Lands in eastern and southern Michigan (Section F2) from mid-June through October. Maintenance workers Blazo and Nowosatko were on the road approximately 5 weeks each. This extraordinary level of heavy equipment use and transport resulted in high maintenance and repair costs.

The 6-way under carriage mounted blade on the D4-E bulldozer required repair twice during the field season. Both breakdowns occurred off-station during wetland restoration work. Repair costs totalled approximately $2,000. This inappropriate blade setup was replaced in November with a standard CAT 4-way blade purchased for $1,900. Dismantling the old blade and fitting the replacement was a major force account project.

Used 4-way blade purchased for the D-4 bulldozer. Replacement and fitting was accomplished force account. (11/88; EM)

Maintenance workers Blazo and Nowosatko remained busy from freeze-up through year's end "catching up" on heavy equipment and vehicle maintenance and preparing seasonally used equipment for winter storage. Approximately 300 board-feet of white oak planking was purchased to replace the deteriorated decking on the heavy equipment transport trailer. The trailer also required new tires and brake work and will undergo a major renovation in early 1989. In addition, both the road grader and backhoe required tire replacement during the year. Slave cylinders for both forward hydraulic rams on the front-end loader were rebuilt and numerous other repairs were completed.

5. Communication Systems

During the year the telephone system was upgraded to the touch tone service. Eleven portable radios and chargers were taken into Anderson Radio, Inc. to be checked and serviced. No major maintenance was done but all the equipment was cleaned and tested. Also, new batteries were purchased for each portable radio.

6. Computer Systems

Debra Southworth, from the Regional Office, visited in June to assist with set-up and operation of the latest system components and software. The Chart program has enhanced station graphics, particularly in the Annual Water Management Plan and Narrative Report. Unfortunately, technical problems prevented use of CompuServe. New computer furniture was purchased late in the year, and a new system location and configuration is planned for early in 1989.

J. OTHER ITEMS

1. Cooperative Programs

Cooperation between the Michigan Department of Natural Resources and the refuge continued in 1988. The State provided administrative support for the refuge goose hunt (Section H.8.a). In return, refuge staff collected morphological data from harvested geese (Section H.8.a). In addition, the agreement allowing the State to manage waterfowl hunting in the Pool 4 Area remained in effect this year.

An agreement between the Service and the Saginaw County Mosquito Abatement Commission provides for treatment of up to 1,000 acres of the refuge with a biological larvicide. In accordance with a 1986 Environmental Assessment, the impact of treatments on non-target species would be monitored over a 3-year period. While the Commission samples invertebrate populations, refuge personnel and volunteers survey avian populations in treated versus untreated study areas. This was the second of a 3-year monitoring effort.

3. Items of Interest

Maintenance Mechanic Blazo combined his proficiency as a wood carver with a little Service pride.

Maintenance mechanic Larry Blazo with relief carving. (1/88; RW)

4. Credits

This report was written, edited, typed, and assembled by the refuge staff.

M. WILDERNESS AND SPECIAL AREAS ADMINISTERED BY SHIAWASSEE

1. Michigan Islands NWR

The Michigan Islands NWR was established by Executive Order 9334 in 1943 as a refuge and breeding ground for migratory birds and other wildlife. These three islands: Shoe and Pismire in Lake Michigan and Scarecrow in Lake Huron are 2, 3, and 7 acres in size, respectively, and are similar in character. In 1965 a fourth island, Thunder Bay, was added to the refuge by the U.S. Coast Guard under a revocable permit, with 5-year renewal periods. Renewal of the permit was accomplished in 1985. The Service has secondary jurisdiction on 121 acres of the total 168 acres at Thunder Bay Island. Gull Island (230 acres) became the fifth island in the system in 1969 when it was ceded to the Service by the U.S. Coast Guard. The three original islands in the Michigan Islands NWR were designated as Wilderness Areas in 1970 under Public Law 91-504, Stat. 1104.

The larger islands are used heavily by migrating and nesting birds. Notable nesting species include gulls, terns, cormorants, herons, and limited waterfowl. Increasing lake levels during most of this decade have inundated some land areas, especially on Shoe Island in Lake Michigan.

2. Wyandotte NWR

Wyandotte NWR was established by Congress in 1961...."to be maintained as a refuge and breeding place for migratory birds and other wildlife". However, "breeding place" in the authorizing document has little application since production potential is very limited. The refuge is located in the Detroit River just off shore from the cities of Wyandotte and Ecorse, and consists of two small islands, Grassy and Mamajuda, and their surrounding shoals approximately to the six-foot contour depth. Total size is approximately 304 acres. Grassy Island has been used as a confined disposal facility for contaminated dredge spoil since the late 1950's. Mamajuda Island has long had less than one acre above the waterline. Within the last ten years high water levels and erosion have resulted in only an occasional boulder or concrete slab and a metal navigational aid structure above water.

The refuge was historically important as one of the most significant staging areas for diving ducks in the United States. Extensive beds of wildcelery and associated submerged vegetation attracted large concentrations of divers, particularly canvasback and scaup. However, over the last 100 years, industrial discharges, municipal sewage effluent, urban runoff, and combined sewer overflows have degraded the Detroit River ecosystem. Dredging, disposal of dredged material, and the operation of large and deep-draft vessels have further eroded fish and wildlife values.

To date, management of Wyandotte has focused primarily on restricting dredged spoil deposition to the Grassy Island site to protect important celery beds. In addition, prior to 1982, a closed area was established each year along shoals adjacent to Grassy and Mamajuda Islands to provide sanctuary during the waterfowl season. This practice was discontinued, however, due to declining waterfowl use of the area and the high cost of transport, set-up, and removal of buoys by Shiawassee NWR personnel based approximately 100 miles away.

Boundary posting of the Grassy Island uplands is inspected and maintained on an annual basis. Reposting was last accomplished in 1986. Law enforcement, however, is difficult in light of the distance from Shiawassee. Michigan Conservation Officers assist by providing occasional patrol of the area.

In late 1987, the Corps of Engineers relinquished their right to use Grassy Island as a dredged material disposal site. Because of liability questions focusing on long-term maintenance of the site, the refuge was requested to conduct a biological assessment of Wyandotte.

The assessment was completed in late 1988. Summaries of 1988 field investigations, excerpted from the assessment, are presented below:

On March 24, Manager Prusa and Assistant Manager Weide looked briefly at Grassy Island and vicinity for a general orientation. Waterfowl present included common merganser, scaup, ringneck, and mallard. Fewer than 100 total ducks were observed. About 200 ring-billed gulls and several muskrats were also noted. Most wildlife activity was centered on the settling pond at the island's north end.

In July, East Lansing Ecological Services personnel collected wildlife and sediment samples from Grassy Island for contaminants analyses. Species taken included Canada geese, mallard, blue-winged teal, gadwall, woodcock, common tern, and Forster's tern. Results of testing had not been received at this writing and probably will not be available for another year.

On October 31st and November 1st, Assistant Managers Merritt and Weide visited Wyandotte. The objective was to assess biological characteristics, particularly waterfowl use during the fall migration.

Grassy Island

Dredge spoils were dry and colonized primarily by giant reed grass (Phragmites australis). Scattered cottonwood, box elder, and willow were also common.

Dominant habitat on Grassy Island. (10/88; RW)

Other species present included:

Common burdock	Cirsium sp.	Polygonum sp.
Catnip	Kentucky bluegrass	Wild millet
Pokeweed	Common dandelion	Cyperus sp.
Aster spp.	Solidage sp.	Staghorn sumac
Stinging nettle	Common nightshade	Chinese elm
Queen Anne's lace	Trifolium sp.	Silver maple
Evening promise		

Wildlife was generally scarce on the island. Limited raccoon signs and a few songbirds were present. A killdeer was observed near the settling pond. Dense moist soil vegetation was found on mudflats adjacent to the pond.

Settling pond at north end of Grassy Island. (10/88; RW)

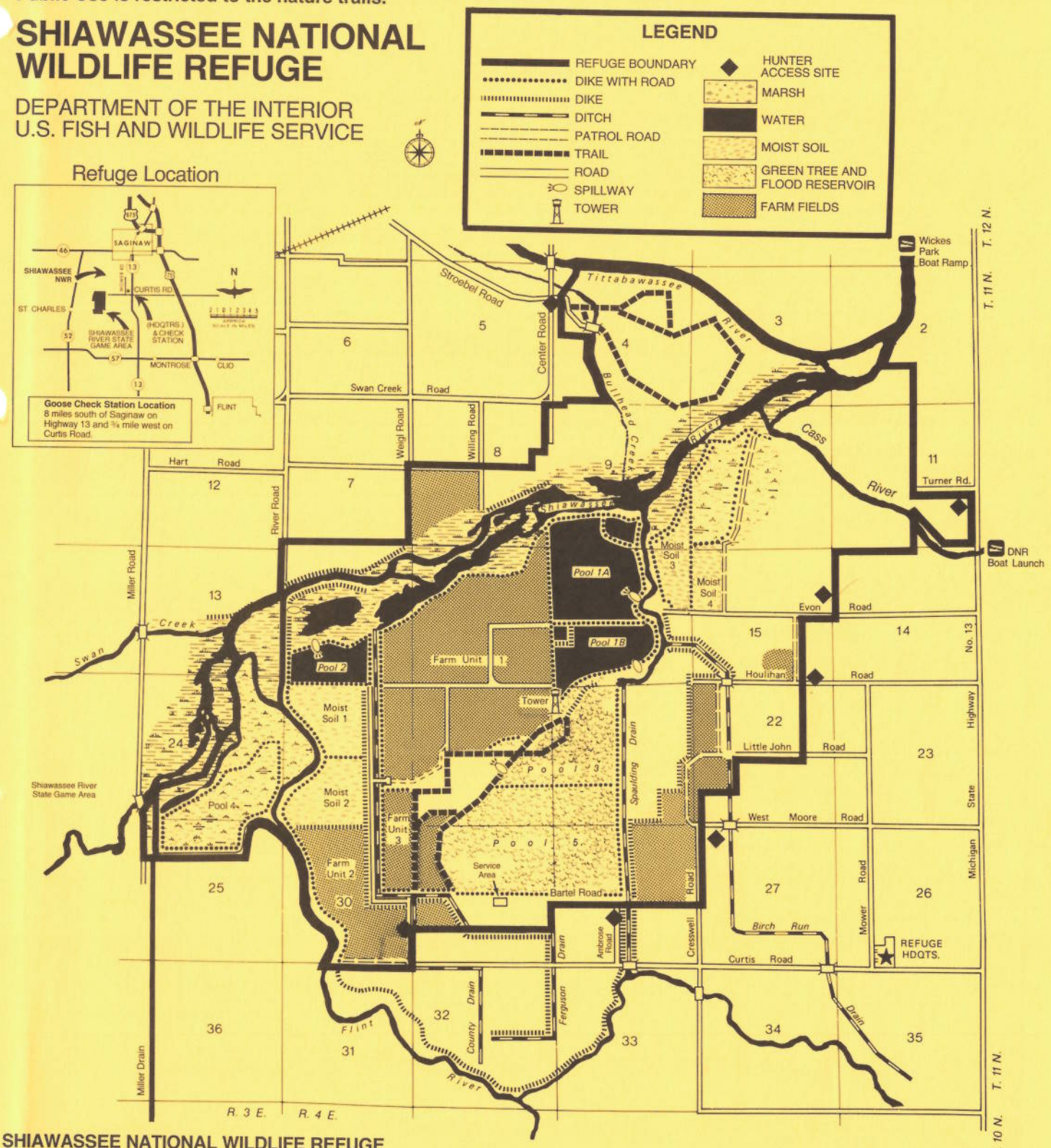
Shoals

Ring-billed and herring gulls were using exposed rocks to the north of Grassy Island and a kingfisher was noted along the west shore. About fifteen mallards and gadwalls were observed feeding/loafing in a protected bay on the west side of the island. The bay contained an estimated 20 acres of submersed aquatics.

Public Use is restricted to the nature trails.

SHIAWASSEE NATIONAL WILDLIFE REFUGE

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE



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